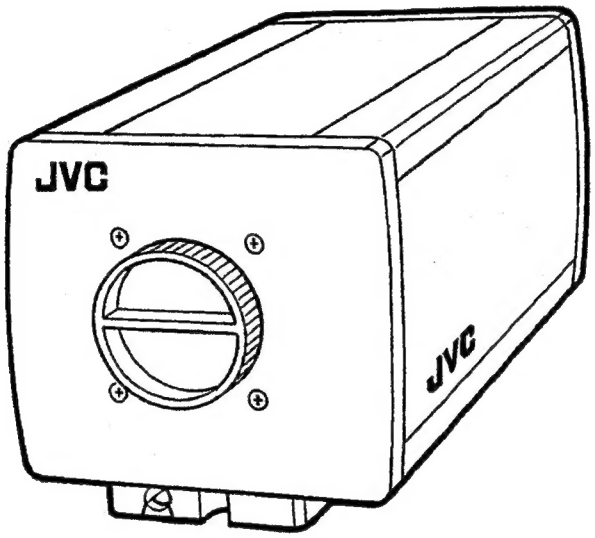
JVC

SERVICE MANUAL

COLOUR VIDEO CAMERA HEAD

TK-1070E

BASIC CHASSIS
V57



(NOTE)
Electrical components having special safety-related characteristics are identified by shading (▒) on the schematic diagram and by(⚠)on the parts list in SERVICE MANUAL. When replacing these components, by sure to use designated parts.

CONTENTS

No.50564
May 1991

SPECIFICATIONS

Item	Content
Type	Colour video camera head
Signal system	Based on PAL standard
Image pick up element	2/3-inch interline-transfer system CCD solid-state image sensor (single board type, with complementary color system)
Number of effective pixels	756(H) × 581(V)
Scanning lines	625lines, 2:1 interraced
Scanning frequency	15,625Hz(H) , 50Hz(V)
Sync. system	Internal / External (Automatic)
Sync. input	Composite video signal : 1Vp-p, 75Ω unbaranced(BNC connector) Black burst signal : 0.45Vp-p, 75Ω HD / VD : 4Vp-p, 75Ω (Negative)
Sync. output	Composite sync. signal : 2Vp-p, 75Ω (Negative)
Video output	Composite video signal : 1Vp-p, 75Ω unbaranced(BNC connector) Separated Y/C video signal : Y / 1Vp-p, 75Ω unbaranced C / 0.3Vp-p(burst) , 75Ω unbaranced RGB video signals : 0.7Vp-p, 75Ω
Video S/N	47dB(GAIN "0", DETAIL "OFF", GAMMA"0.45", SHUTTER "NORM")
Horizontal resolution	Composite : 460 TV lines Y/C : 470TV lines RGB : 460 TV lines
Standard required illumination	2000Lux(F5.0, 3200K)
Switching function	AGC selection "AUTO / FIX" GAIN selection "0 / +6dB / +12dB" SHUTTER mode selection "NORM. / 1/120 / 1/125 / 1/250 / 1/500 / 1/1000 / 1/2000 / 1/4000 / 1/10000" WHITE BALANCE mode selection "☼(halogen lamp) / AUTO / MANU." DETAIL selection "ON / OFF" GAMMA selection "0.45 / 1"
Adjusting function	Flange-back adjustment manual white balance adjustment (2 axes : R-B, G-Mg) H PHASE adjustment SC PHASE adjustment
Lens mount	C mount
Power requirement	DC12V (±10%)
Power consumption	8.7VA(when input DC12V, when jointing HZ-C611AF(U))
Operating temperature range	0°C~ +40°C
Operating humidity range	Less than 90% Rh (noncondensing)
Fuse	⚠QMF51E2-1R0S (T1.0A)
Provived accessory	Lens mount cap ×1 Iris plug(3-pin) ×1 Connection cable ×1 Control section cover ×1
Dimensions	Width : 83.5mm(max.) , Depth : 135mm(max.) , Height : 82mm(max.) [including control section cover and tripod mounting base]
Weight	Approx. 710g (Only body)

Design & specification subject to change without notice.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION:
To prevent electric shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

CAUTION:
To prevent electric shocks and risk of fire hazards, do NOT use other than the specified power source.

This installation should be made by a qualified service person and should conform to all local codes.

Thank you for purchasing this JVC colour video camera head.

The TK-1070E is a colour video camera head using a single CCD (Charge Coupled Device) solid-state pick-up element.

This camera head is for use in an image processing system (processing system for picture composition, graphics, editing, synthesis, measurement, recognition, analysis, etc.) shooting such material as images of paintings, photographs, real subjects, etc. for processing.

This instruction manual is divided into three sections: English, German and French.

CONTENTS

FEATURES

- 2/3" high-precision CCD (Charge Coupled Device) (with approx. 440,000 effective pixels) solid-state pickup element for clear pictures without image lag, burn or geometrical distortion.
- High-resolution design for a horizontal resolution of 470 TV lines (separated Y/C video signals).
- Optical RGB filters to realize superior colour reproduction.
- Outputs 3 types of video signal: composite video signal, separated Y/C video signals and RGB colour video signals.
- Gen-lock operation is possible by inputting an external sync reference signal (HD. VD, composite video signal or black burst signal).
- Gamma correction switch to allow connection to a wider range of systems.
- All switches, adjustment controllers and button can be operated from the side of the unit.
- White balance adjustment with three settings "halogen lamp", "MANU" or "AUTO (memory)", according to the colour temperature of the ambient light.
- Built-in electronic shutter allows switching between 9 shutter speeds.
- AGC (Automatic Gain Control) function to automatically increase camera's sensitivity when the level of ambient light drops.
- DETAIL switch to emphasize edges of the playback pictures.
- Convenient external flange-back adjustment function.
- Designed for use with optional video camera lens HZ-C611AF(U) (F1.2, f =11–66 mm, 6:1 zoom ratio, auto focus, electric zoom).
- The camera can be installed using either the bottom or top panel, according to the installation location.

PRECAUTIONS

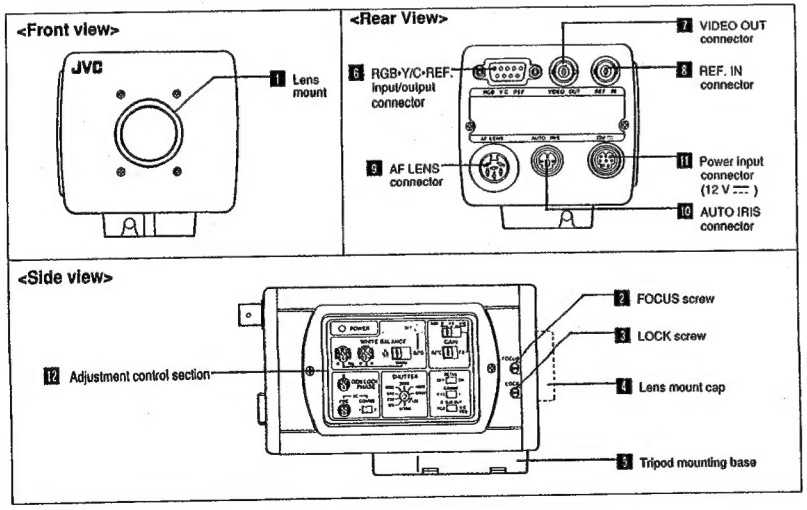
(INSTALLATION)

- **Never expose the camera to rain or water.**
  Water can cause malfunctions and damage the camera.
- **Do not install the camera where the temperature could exceed the allowable range.**
  If used at extremely low or high temperatures, the camera could be damaged (allowable operating temperature range 0°C to +40°C).
- **Avoid installing in a humid or dusty place.**
  This could damage the camera.
- **Avoid installing in places where there is radiation.**
  This could damage CCD and other components and cause a malfunction.
- **Avoid installing in places where there are strong magnetic fields and electric signals.**
  The picture could be distorted.
- **Avoid installing in places where the camera would be subject to strong vibrations.**
  This could damage components and degrade the picture.

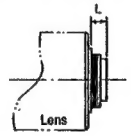
* Also fully read "Precautions (use)" on page 16.

OPERATING INSTRUCTIONS

CONTROLS AND THEIR LOCATIONS



1 Lens mount
This mount is for the installation of a C-mount lens. Install the optional video camera lens HZ-C611AF(U) exclusively designed for this camera. A 2/3" C-mount lens for a TV camera also can be installed.
Note:
- If distance L of the lens (shown below) is more than 8 mm, the lens cannot be installed on this camera.



2 FOCUS screw
When a lens is mounted, the adjustment of flange-back (the distance from the lens mounting position to the focal point) may sometimes be required. When the flange-back is not correct, focusing may not be possible with the focus ring of the lens. Turn this screw to adjust the flange-back so that the best focus can be obtained. Loosen the LOCK screw when adjusting, and re-tighten it upon completion.

3 LOCK screw
Loosen this screw when turning the FOCUS screw to adjust the flange-back (the distance from the lens mounting position to the focal point). Upon completion of adjustment, re-tighten it.

4 Lens mount cap
The cap prevents dirt getting into the camera and protects internal parts from dirt and damage. Be sure to cap the lens mount when the lens is not mounted.

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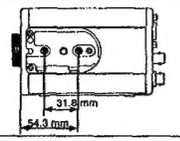
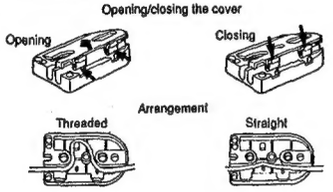
5 Tripod mounting base

This is the base for installing the camera. 2 screw holes (1/4"-20UNC) are provided for mounting the camera on a fixed or rotating base or tripod. When the case is to be installed on the top panel, reposition the tripod base on the top panel. Since the 2 screw holes are provided, if you want to strengthen the installation, use both screw holes. The iris cable of the lens can be stored and fixed in this base.

- **Dimensions**

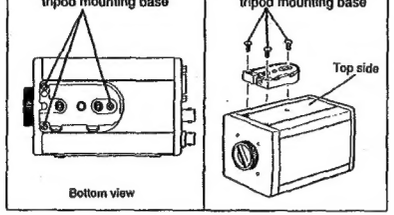


- **Arranging the iris cable**



- **Repositioning procedure**

(1) Remove the three screws (black) retaining the tripod mounting base to remove it from the bottom panel.
(2) Attach the tripod mounting base to the top panel with three screws (black).



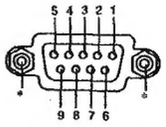
6 RGB•Y/C•REF. input/output connector

This connector outputs either RGB video signals or separated Y/C video signals (select with the RGB•Y/C select switch. See " 13 Adjustment control section" on page 11.), the composite video signal, and composite sync signal. Also, the external sync reference signal (composite video signal, black burst signal and HD. VD) can be input to this connector.
Connect this connector to the video signal connector of an image processing system. When the connectors of the image processing system are BNC connectors, use the optional camera cable VC-463-2E.
In the case of a D-sub connector, use the optional D-sub – D-sub cable VC-452-2E.

Notes:

- Use a connection cable with an impedance of 75 ohms. (The cable should be as short as possible.)
- When the external sync reference signal to be input is less than –4 dB with respect to the reference level, sync operation is not possible.
  Reference level:
  Composite video signal = 1 Vp-p, 75 ohms
  Black burst signal = 0.45 Vp-p, 75 ohms
  HD. VD = 4 Vp-p, 75 ohms (Negative)
- Do not input the composite video signal (or black burst signal) and the HD. VD together.
- Do not input the external sync reference signal to both REF. IN connector and the RGB•Y/C•REF. input/output connector.
- When the optional camera cable VC-451-2E is used, gen-lock operation with HD. VD is not possible.

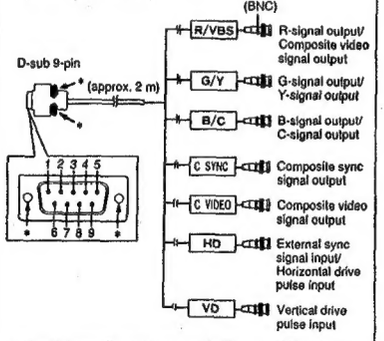
Pin assignment: RGB•Y/C•REF. input/output connector (D-sub 9-pin)



* Use 2.6 mm-diameter screws (millimetric pitch screw) when attaching plug.

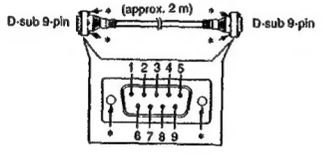
Pin No.	Signals when RGB is selected	Signals when Y/C is selected
1	Vertical drive pulse input (VD)	
2	GND	
3	R (RED) output	Composite video output (VBS)
4	G (GREEN) output	Y (luminance) output
5	B (BLUE) output	C (chroma) output
6	Composite video signal output (VBS)	
7	Composite sync output (C. SYNC)	
8	GND	
9	External sync input (VBS, B.B.), Horizontal drive pulse input (HD)	

- **Camera cable VC-463-2E (optional)**
  (D-sub 9-pin – BNC x 7)



* Use 2.6 mm-diameter screws (millimetric pitch screw) when attaching plug.

- **D-sub – D-sub cable VC-452-2E (optional)**
  (D-sub 9-pin – D-sub 9-pin)



* Use 2.6 mm-diameter screws (millimetric pitch screw) when attaching plug.

7 VIDEO OUT connector

BNC connector to output a composite video signal. Connect to the video input connector of a monitor, VTR, etc.

8 REF. IN connector

BNC connector to input the external sync reference signal, such as a composite video signal or black burst signal. When the sync reference signal is input, the camera automatically switches from the internal to external sync mode to perform gen-lock operation.

Notes:

- When the external sync reference signal to be input is less than –4 dB with respect to the reference level, sync operation is not possible.
  Reference level:
  Composite video signal = 1 Vp-p, 75 ohms
  Black burst signal = 0.45 Vp-p, 75 ohms
- When operating the camera using the internal sync reference signal, unplug the connector.
- When the external sync reference signal is being input to the RGB•Y/C•REF. input/output connector, do not use this connector.

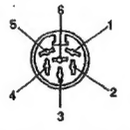
9 AF LENS connector

Connect the lens plug of the optional video camera lens HZ-C611AF(U) to this connector.

Note:

- When picture is wholly bright or dark, adjust it by Iris Compensation knob. (Iris is automatically set regardless of iris compensation setting.)

Pin assignment: AF LENS connector (DIN 6-pin)



Pin No.	Signal
1	DC 12V
2	GND
3	DC 8.5V
4	—
5	Iris control DC voltage
6	GND

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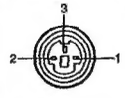
⑩ AUTO IRIS connector

When using an auto-iris lens other than the optional HZ-C611AF(U), connect the iris cable of the lens to this connector.

Notes:

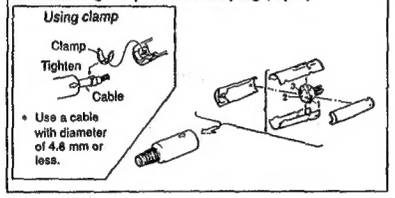
- Use auto-iris lenses using with a power consumption of 50 mA or less.
- If the cable has a plug of a different type, replace with the provided 3-pin iris plug.

Pin assignment: AUTO IRIS connector (3-pin)



Pin No.	Signal
1	GND
2	Video (0.7 Vp-p, high impedance, no sync)
3	DC 11.5 V (50 mA max)

Assembling the provided iris plug (3-pin)



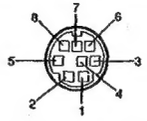
⑪ Power input connector (12 V ⎓)

Input connector for power (DC 12 V).
Use the provided cable for connecting the camera to optional AC adapter AC-C724 (for the UK) or AC-C722 (for countries other than the UK).

Note:

- Use a power source of DC 12 V.

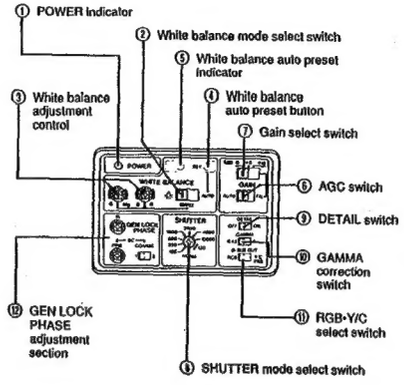
Pin assignment: Power input connector (8-pin)



Pin No.	Signal
1	—
2	GND (DC 12 V)
3	—
4	GND
5	GND (DC 12 V)
6	DC 12 V
7	GND
8	DC 12 V

⑫ Adjustment control section

Adjust and set, according to the shooting conditions and the equipment connected to the camera. After completing adjustments and settings, install the control section cover (provided, refer to page 13).



① POWER indicator

Lights when the camera is powered.

② White balance mode select switch [☼ , MANU, AUTO]

Selects the white balance mode.

☼ : For shooting under the artificial light such as halogen lamps (colour temperature approx. 3200K).
MANU : Manual adjustment is possible.
AUTO : For setting to the white balance stored by the white balance auto preset button.

③ White balance adjustment controls [G-Mg, B-R]

When the white balance mode select switch is set to "MANU", the white balance can be adjusted manually. (Use correctly adjusted colour monitor to check the white balance.)

G-Mg : Turn to the "G" side to increase the amount of green in the picture.
Turn to the "Mg" side to increase the amount of magenta.
B-R : Turn to the "B" side to increase the amount of blue.
Turn to the "R" side to increase the amount of red.

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④ White balance auto preset button [SET]

With the white balance mode select switch set to "AUTO", the white balance required for a particular lighting can be stored in memory. Press the white balance auto preset button to memorize the white balance, while shooting a white object. The white balance auto preset indicator lights. (Colour temperature that can be stored in memory is from 2800K to 6000K.)

Note:

- When the shooting conditions change (when the colour temperature of the lighting changes), reset the white balance.

⑤ White balance auto preset indicator

Lights to indicate that the white balance has been stored in memory.

⑥ AGC (Automatic Gain Control) switch [AUTO, FIX]

Switches the setting of the camera's sensitivity.

AUTO : AGC activated. The camera's sensitivity is automatically made to increase when the level of ambient light drops.
FIX : The sensitivity set with the Gain select switch is engaged.

Note:

- When set to "AUTO", if the AGC is activated, the playback picture will become slightly grainy.

⑦ Gain select switch [0, +6, +12]

Switches the sensitivity when the AGC switch is set to "FIX".

0 : Normal sensitivity is engaged.
+6 : Sensitivity increased by 6 dB. (The picture becomes slightly grainy.)
+12 : Sensitivity increased by 12 dB. (The picture becomes grainy.)

⑧ SHUTTER mode select switch

This varies the shutter speed (the time the charge is stored). Normally, when a fast-moving object is being shot, still or slow-motion played back pictures will be blurred. In this case, switching the shutter speed from the normal speed of 1/25 second to a faster speed allows each frame to be recorded with greater detail, at the higher speed.

Switch position	Shutter speed
NORM	1/25 second Normally, set to this position.
120	1/120 second
125	1/125 second
250	1/250 second
500	1/500 second
1000	1/1000 second
2000	1/2000 second
4000	1/4000 second
10000	1/10000 second

Notes:

- Faster shutter speeds require more light than the normal speed. (In the 1000 mode, the sensitivity is approx. 1/40 that at normal speed; in the 10000 mode, approx. 1/400.)
- At faster shutter speeds, shooting with artificial lighting (especially fluorescent lights) will cause the pictures to flicker. Smear (bright horizontal or vertical lines) which can often be seen with solid-state pickups may appear in the picture.

⑨ DETAIL switch

Emphasizes the edges of the playback picture.

ON : Emphasizes the edges of the picture. When connecting a monitor, etc., set to this position.
OFF : The edges of the picture are not emphasized. When connecting an image processing system, etc., set to this position.

⑩ GAMMA correction switch

Switch depending on the connected equipment.

0.45 : Gamma is corrected. When connecting a monitor, VTR, etc., set to this position.
1 : Gamma is not corrected. When connecting an image processing system, etc., set to this position.

⑪ RGB•Y/C select switch [D-SUB OUT]

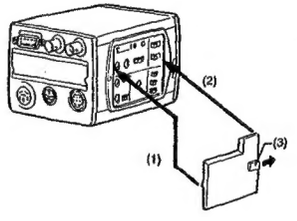
Switches the output signals of the RGB•Y/C•REF. input/output connector.

RGB : Outputs RGB signals, composite video signal and composite sync signal.
Y/C VBS: Outputs separated Y/C video signals, composite video signal and composite sync signal.

⑫ GEN LOCK PHASE adjustment section

See "ADJUSTMENT FOR GEN-LOCK OPERATION" on page 15.

• Installation of the control section cover (provided)



(1) Insert the lug of the cover into the hole.
(2) Cover the section.
(3) Slide the cover lock knob in the direction of the arrow to secure it.

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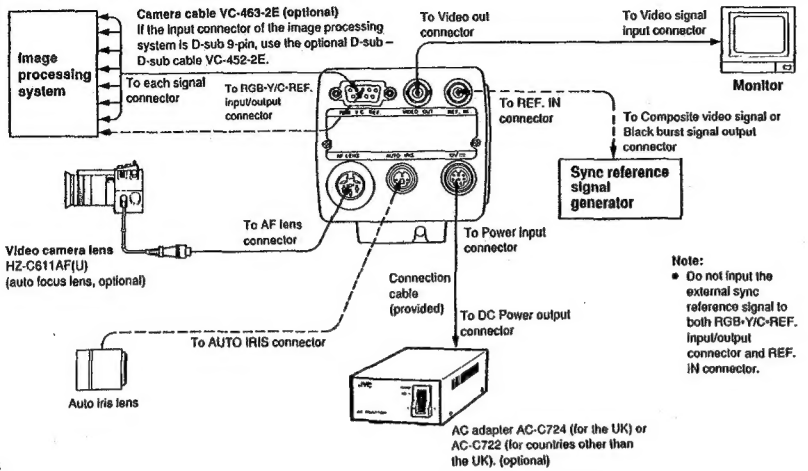
CONNECTION EXAMPLES

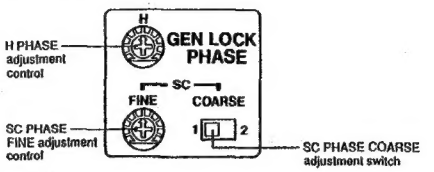
- **Do not supply power to any of the connected equipment until all the connections are completed.**
- **Thoroughly read the instruction manuals of all equipment to be connected.**



Note:
- Do not input the external sync reference signal to both RGB•Y/C•REF. input/output connector and REF. IN connector.

ADJUSTMENTS FOR GEN-LOCK OPERATION

When performing gen-lock operation by inputting an external sync reference signal, adjust the phase if necessary. The horizontal phase (H PHASE) needs to be adjusted and also colour sub-carrier phase (SC PHASE) adjustment is necessary when the external sync reference signal is a composite video signal or a black burst signal.



- **Horizontal phase adjustment [H PHASE]**
  Adjusts the horizontal phase by this controller.
- **Colour sub-carrier phase adjustment [SC PHASE]**
  Adjusts the colour sub-carrier phase by these controllers. Adjust by changing the setting (1 or 2) of the SC PHASE COARSE adjustment switch in conjunction with the SC PHASE FINE adjustment control. (This adjustment is not necessary when the external sync reference signal is HD. VD. Also, this has no effect on RGB signals.)

Notes:
- Gen-lock operation may become unstable using a signal containing severe jitter such as the signal played back by a VTR.
- For more details, consult your local dealer.

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PRECAUTIONS

(USE)

When operation is incorrect or a malfunction is observed:

While operating, if any abnormal condition (strange sound, smell or smoke) or a malfunction (no picture, etc.) is observed, stop using the camera immediately, turn the power off, then call your local dealer.

Cleaning

Turn the power off and wipe off the dirt with a dry soft cloth. If it is extremely dirty, use furniture cleaner to wipe it off.
To clean the lens, use a blower or lens cleaning tissue (available from any camera dealer).

- **Do not point the camera at the sun.**
  This could damage the camera, whether it is operating or not.
- **Do not shoot any source of bright light.**
  If the object contains very bright areas, bright vertical or horizontal lines may appear on the screen. This is called "smear", a phenomenon which often occurs with solid-state pick-ups, and is not a malfunction.
- **Do not disassemble the camera**
  and never touch parts inside the camera as you could *damage the camera.*
- **Do not allow anything to get inside the camera.**
  If a metal or flammable object gets inside the camera, it may cause a malfunction.
- **Handle with care.**
  Do not drop the camera or subject it to shocks and vibrations to avoid possible damage.

• Also fully read "Precautions (installation)" on page 3.

SPECIFICATIONS

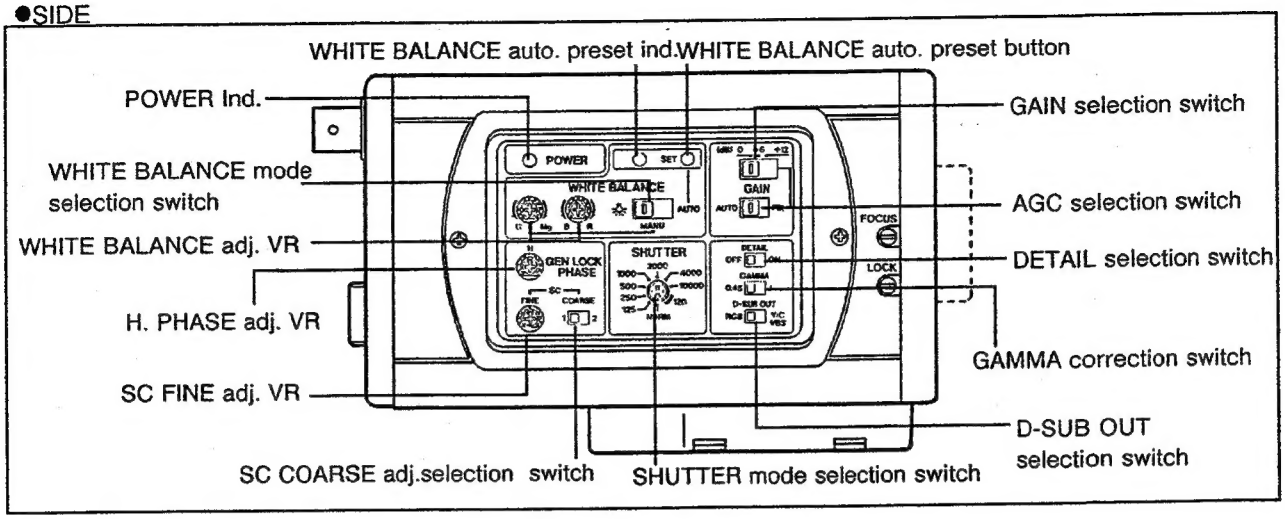
Type	: Colour video camera head
Signal system	: Based on PAL standard
Pick-up element	: 2/3" CCD solid-state image sensor, single CCD complementary colour system
Effective pixels	: 756 (H) x 581 (V)
Scanning lines	: 625 lines, 2:1 interlaced
Sync system	: Internal/External (Automatic)
Sync input	: Composite video signal: 1 Vp-p, 75 *ohms* Black burst signal: 0.45 Vp-p, 75 ohms HD. VD: 4 Vp-p, 75 ohms *(Negative)*
Sync output	: Composite sync signal: 2 Vp-p, 75 ohms (Negative)
Video output	: Composite video signal: 1 Vp-p, 75 *ohms* Separated Y/C video signals: Y 1 Vp-p, 75 ohms C 0.3 Vp-p (burst signal), 75 ohms RGB video signals: 0.7 Vp-p, 75 *ohms*
Video S/N (standard)	: 47 dB (Gain select to "0", detail switch set to "OFF", gamma correction switch set to "0.45", shutter mode select switch set to "NORM")
Horizontal resolution	: Composite: 460 TV lines Y/C: 470 TV lines RGB: 460 TV lines
Recommended illumination	: 2000 lux (f/5.0, 3200K)
Switching function	: Gain select (AUTO, 0, +6 dB, +12 dB) Shutter mode (NORM, 1/120, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000) White balance mode (halogen lamp, MANU, AUTO) Detail select (ON, OFF) Gamma correction select (0.45, 1) D-Sub output select (RGB, Y/C VBS)
Adjustments	: Flange-back, manual white balance (2 axes; G-Mg, B-R), H PHASE adjustment, SC PHASE adjustment
Lens mount	: C mount
Power requirement	: DC 12 V (±10%)
Power consumption	: 8.7 VA
Operating temperature range	: 0°C to +40°C
Operating humidity	: Less than 90% Rh (non-condensing)
Maximum external dimensions	: 83.5(W) x 135(D) x 82(H) mm (including tripod mounting base and control section cover)
Weight	: Approx. 710 g (Only body)
Provided accessory	: Iris plug (3-pin) x 1 Lens mount cap x 1 Connection cable x 1 Control section cover x 1 (The lens mount cap is attached when shipped.)

- Design and specifications subject to change without notice.
- This colour video camera head is designed to output video signals conforming to the PAL standard, so that it cannot be used with video recorders and colour monitors which use colour systems other than PAL.

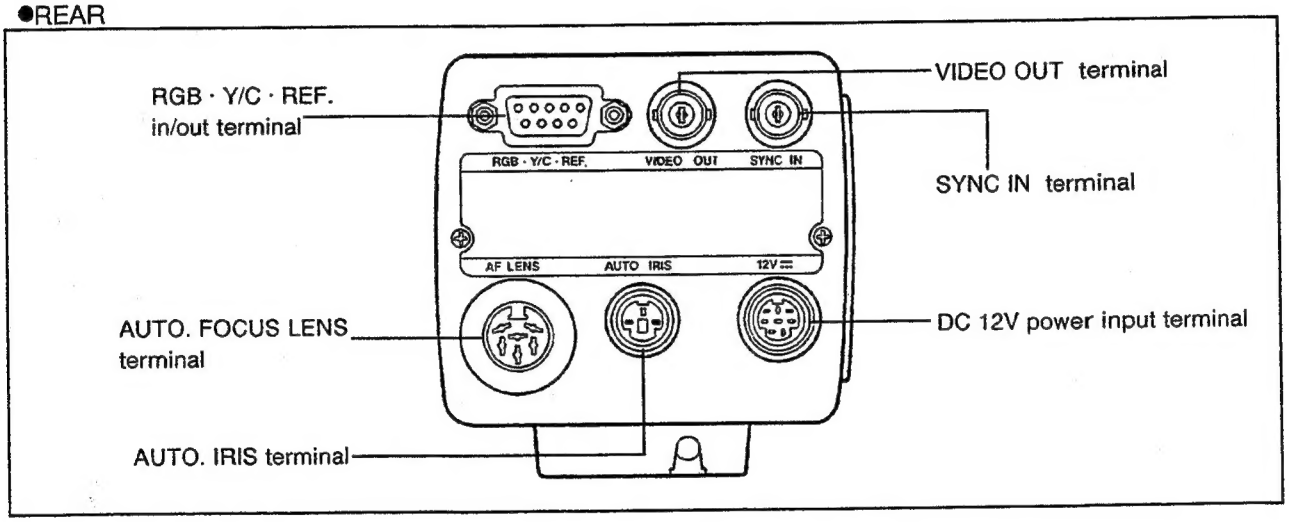
MAIN PARTS LOCATION

■FUNCTION

●SIDE



●REAR



※ **White balance selection switch**

This is the switch which sets the color temperature according to the installation location of the camera head, as color temperature differs with installation location.

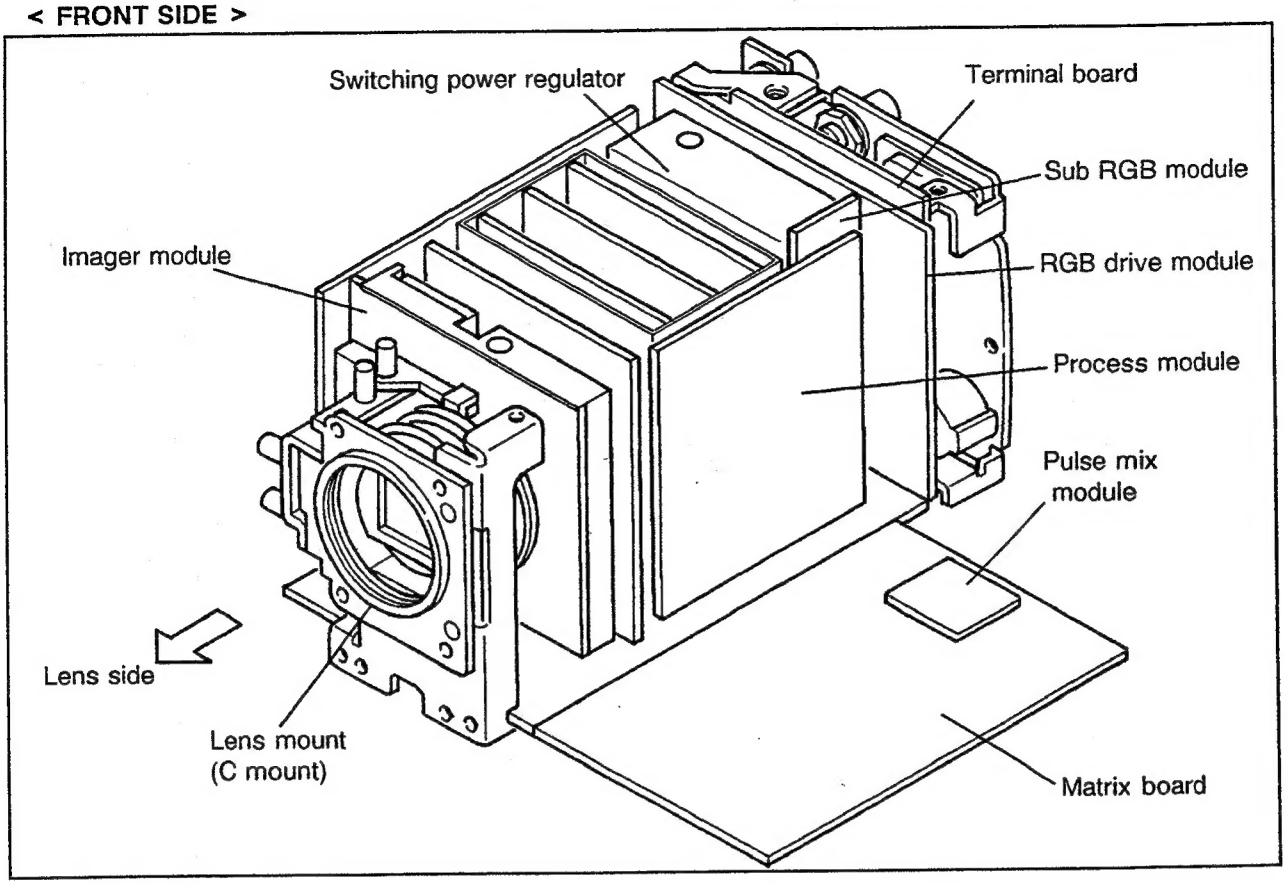
Switch positon	Color temperature
☼ (halogen lamp)	about 3200K
MANU	about 2800K~7000K
AUTO	about 2800K~6000K

※ **Factory switch setting**

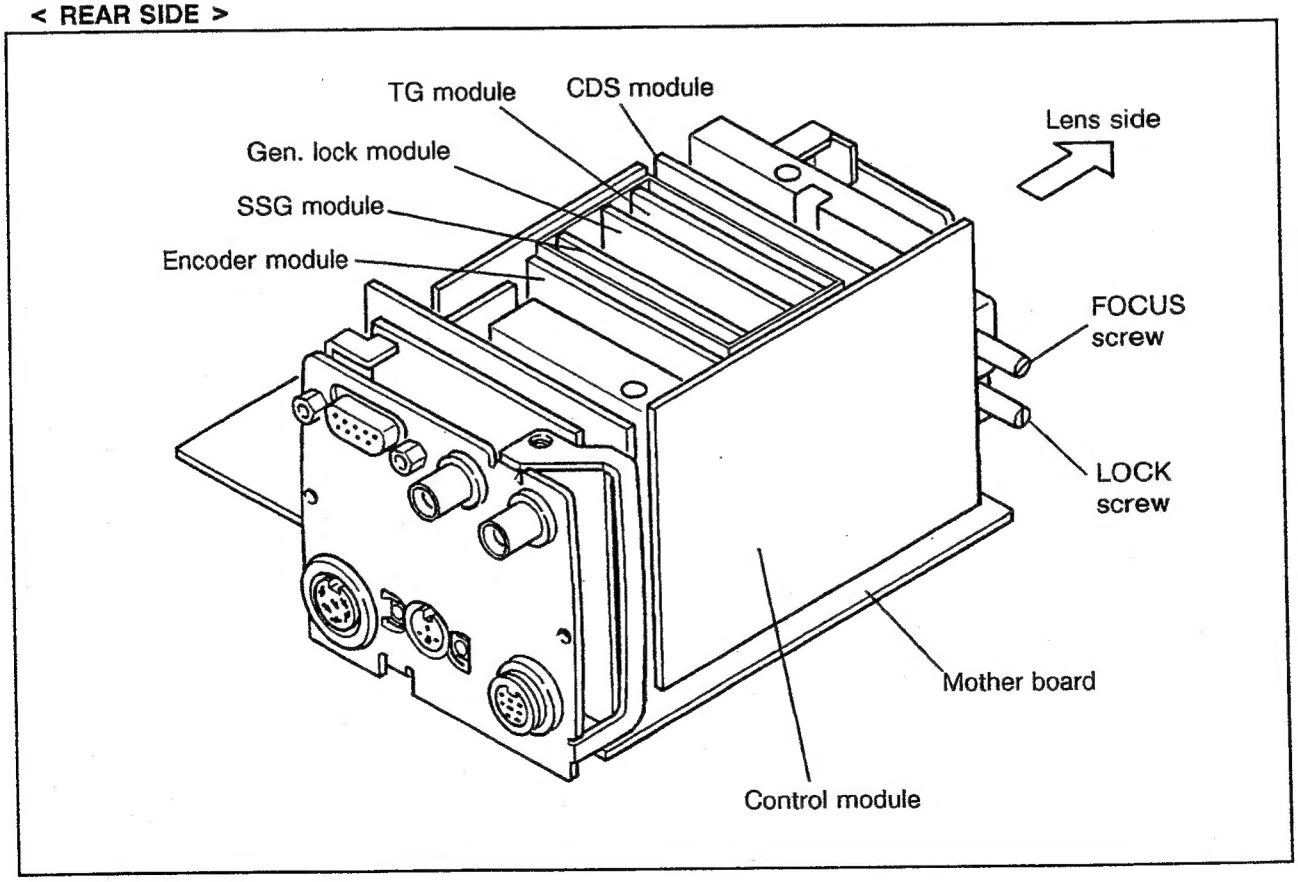
Switches are factory set as follows.

Switch	Position
AGC	AUTO
GAIN	0
WHITE BALANCE	☼
GAMMA	0.45
DETAIL	ON
D-SUB OUT	RGB
SC COARSE	1
SHUTTER	NORM(1/50)

< FRONT SIDE >



< REAR SIDE >



SPECIFIC SERVICE INSTRUCTIONS

■ NOTICE OF SERVICE

●TWO-SIDE HOLE-THROUGH PC BOARD

A two-sided hole-through PC Board is used on this camera. Patterns and wires are designed extra thin to attain highdensity component mounting. Rough handling may damage the patterns/wires or other components. When disassembling, repairing or adjusting the PC boards, exercise care **to avoid damage.**

●REPAIRING CIRCUIT BOARD MODULES

(1) Removing circuit board module

Pull out the circuit board,after removing solder completely with a solder sucker.

NOTE :

- Take care not to damage or remove solder from other parts.
- If more than two circuit boards are removed, make sure that they are replaced in the proper position.
- Some circuit boards cannot be removed unless the shielding case and chassis frame have been removed. When removing any circuit board, check if this applies to the PC board.

(2) Suppling circuit board module

The module circuit board is supplied together with the assembly, but the parts which are filled with lines will not be supplied.

●REPLACING CHIP COMPONENTS

Use a soldering iron (temperature 260~300°C. about 17W) with a slim tip and high insulating ability. those with a solder sucker (about 55W) are usually easier to use.

NOTE :

This video camera uses many mini-flat ICs. To remove these, melt the solder while picking up the individual pin with fine tipped tweezers or cut off the IC pins. Take care not to scratch or peel off the BOARD foil pattern.

●CHIP COMPONENTS DISPLAY

Besides the resistors, short jumpers, FETs, ceramic capacitors, transistors and other chip components, the chip tantalum capacitors and chip variable resistor (CH VR) are used on the camera. None of these chip components are reusable again once they have been used.

NOTE :

1. Avoid rough handling of the VR.
2. Use a thin-tip insulated-type. screwdriver to adjust the CH VR.

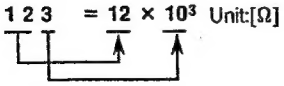
- **How to read printings**

On certain chip components, printing is applied as follows:

① Chip metal glaze resistor (CH MG R)

The diagram shown in **Fig. A-** Ⓐ is applied to some of these resistors.

Reading method (Example)



② Shorting jumper (0[Ω] of CH MG R)

No diagram is applied to shorting jumpers. A"0"is printed on Type Ⓐ shown in **Fig. A**

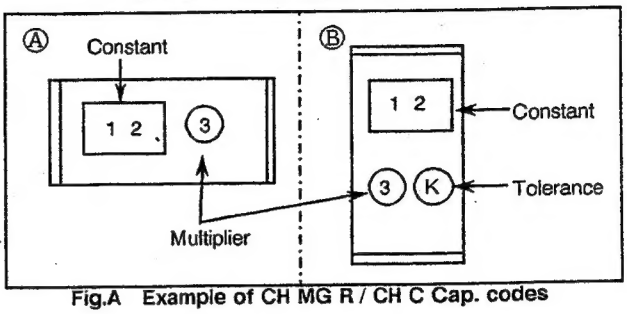
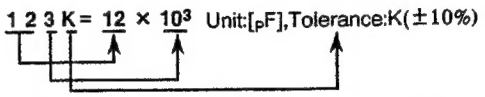


Fig.A Example of CH MG R / CH C Cap. codes

③ Chip ceramic capacitor (CH C Cap.)

- The diagram shown in **Fig. A-** Ⓑ is applied to some of the CH C Caps. On some others, there is no diagram that is of any use to users.

Reading method (Example)



- As shown in **Fig. B** some chip ceramic capacitors are represented by two digits. **Table A** shows how those figures should be read.

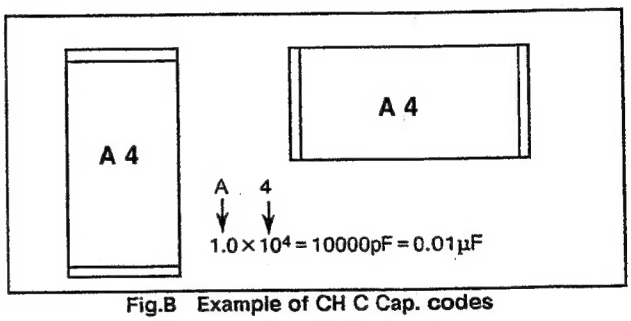


Fig.B Example of CH C Cap. codes

Alphabet	A	B	C	D	E	F	G	H	J	K
Constant	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4
Alphabet	L	M	N	P	Q	R	S	T	U	V
Constant	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2
Alphabet	W	X	Y	Z		a	b	d	e	f
Constant	6.8	7.5	8.2	9.1		2.5	3.5	4.0	4.5	5.0
Alphabet	m	n	t	y						
Constant	6.0	7.0	8.0	9.0						

Numeral	0	1	2	3	4	5	6	7	8	9
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5			10^{-2}	10^{-1}

Table A CH C Cap. capacity value

④ Chip Variable Resistor (CH VR)

A two-digit code is printed on some CH VRs.
They indicate a reading method, as shown in **Table B.**
Three-digit codes are also used. These codes are read in the same way as those for CH MG R.

⑤ Chip Tantalum Capacitor (CH Tan. Cap.)

The diagram shown in **Fig. C** is applied to some of the CH tantalum capacitors.

Reading methd (Example)

The type shown in **Fig. C** is 10μF, 16WV chip tantalum capacitor.

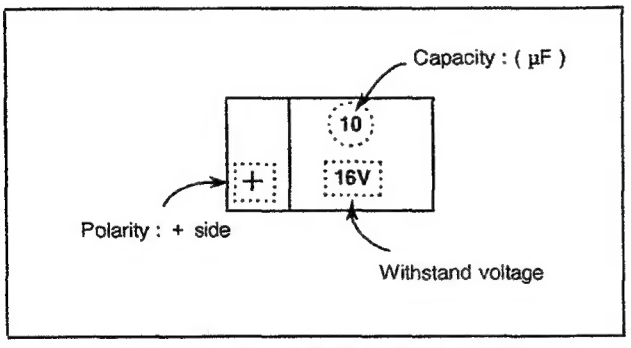


Fig.C Example of CH Tan. C Cap. codes

⑥ Chip Transistor

The labels shown in **Table C** are applied to the chip transistor.

Parts No.	Display method
2SC2778(BC)	Ⓚ Ⓑ / K. C — denotes 2SC2778 parts ranking : B
2SC2404(D)	U. D
2SC2295(BC)	V. B / V. C
2SC4176(4-5)	B34 / B35
2SD601(QR)	Y. Q / Y. R
2SD1030(RS)	1ZR / 1ZS
2SB709(QR)	A. Q / A. R
2SA1610(3-4)	Y33 / Y34
2SA1022(BC)	E. B / E. C

Table C Chip transistor labels

⑦ Chip FET

The following printing is applied to the chip FET.

Parts No.	Display method
2SK198(QR)	⑩ Ⓠ / 10R — denotes 2SK198 parts ranking : Q
2SK94	×1 / ×2 / ×3 / ×4

Table D Chip FET codes

⑧ Chip Diode

The following labels are applied to the chip diode.

Parts No.	Display method
MA151K	Ⓜ H — denotes MA151
MA151WK	M. T
MA157	M. R
1S2853	A3
1S2857	A5
MA3047(L)	4. 7L
MA3056(H)	5. 6H

Table E The display of chip diode

Code	12	22	32	52	72	13	23	33	53	73	14
Resistance Value	100Ω	220Ω	330Ω	470Ω	680Ω	1kΩ	2.2kΩ	3.3kΩ	4.7kΩ	6.8kΩ	10kΩ

Code	24	34	54	74	15	25	35	55	75	16	
Resistance Value	22kΩ	33kΩ	47kΩ	68kΩ	100kΩ	220kΩ	330kΩ	470kΩ	680kΩ	1MΩ	

Table B CH VR resistance value display method in two-dighit

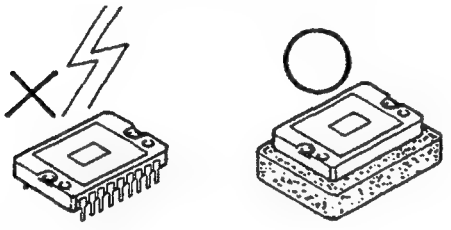
●"CHARGE COUPLED DEVICE (CCD)" IMAGER

1 Precautions for handling and replacing CCD imager

CCD is characteristic of many advantages, but it also has some disadvantages. The following are measures to deal with these disadvantages.

(1)CCD imager is a circuit element which is very sensitive to static electricity.

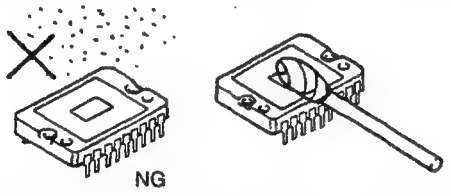
- The potential differences caused by the electrostatic charge-which have been accumulated in the clothing and human body-sometimes destruct the insulation of the CCD imager. Therefore, handle the"high-priced" CCD imager with more attention thereto tan to the C-MOS (Complementary MOS), especially during the dry season and in dry places.



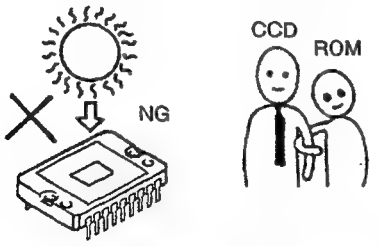
- Maintain the CCD imager in the provided pack or aluminum foil so that it can be kept at the same potential. Never unpack its container until the very moment of servicing.

(2)The CCD imager is easily damaged by dust. Also it suffers considerable deterioration, when exposed to strong light.

- When servicing, make sure that the CCD imager is kept free from such foreign material as dust. Use dry soft cloth or soft cloth moistured with ethyl alcohol to wipe off the foreign material.



- Do not exposed the CCD imager to such strong light as direct sunlight.



(3)CCD imager is damaged instantly by the following malfunctions. Pay close attention to these malfunctions before servicing

① After removal of CCD, charge may remain at each terminal in the circuit side for some time. In this situation, when CCD is inserted to the socket, CCD may be distracted instantaneously due to the charge. To avoid this, CCD should be inserted with passage of some time (2 to 3 minutes) after removal.

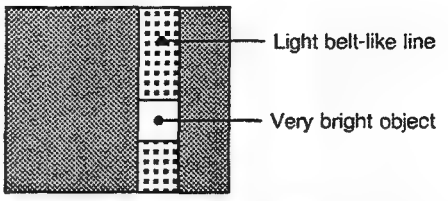
●SPECIAL CHARACTERISTICS OF A CCD

The following phenomena can be expected when using the video camera with the CCD imager; they are not malfunctions.

- **Smear phenomenon**

This phenomenon occurs when shooting a very bright object (such as electronic light, fluorescent lamp, the sun or a strong reflection).

Video monitor screen.



Due to the interline-transfer organization of the CCD image sensors (Refer to "The Interline-transfer Organization of the CCD Image Sensors") , this phenomenon is caused by electronic charges generated beneath the photosensors by a light with a long wavelength, such as an infrared light.

In the shutter mode, as the signal level drops down, the smear level becomes high relatively. However this means no failure.

- **False signal**

When vertical stripes or straight lines are shot, they may look wavy.

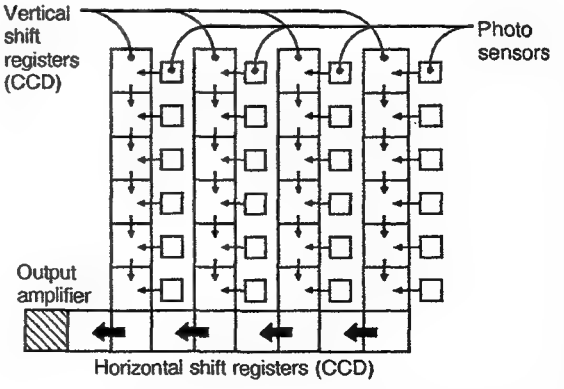
- **Blemishes**

The photosensor elements generate electronic charges which ultimately produce horizontal and vertical rows in the CCD image sensor.

Therefore, any malfunctioning photosensor element will eventually cause a blemish on the monitor screen.

The interline-transfer organization of CCD image sensors

This CCD video camera module adopts an interline transfer organization in which precisely aligned photosensors and vertical shift registers are arrayed interlinearly and horizontal shift register links up with the vertical shift register, as shown. Light variations are sensed by the photosensors,which generate electronic charges proportional to the light intensity. The generated charges are fed into the vertical shift registers all at one. The charges are then transferred from the vertical shift registers to the horizontal shift registers successively and finally reach the output amplifier to be read out successively.



■ DISASSEMBLY PROCEDURE

- Before disassembling each part, be sure to turn off the power.
- When disassembling and replacing, be sure to attach the dust cap to protect the CCD imager and the optical low pass filter.

1. Removing external parts

1-1 Removing the side cover

(1) Remove the two screws of Ⓐ shown in Fig. 1.

1-2 Removing the tripod base

(1) Remove the three screws of Ⓑ shown in Fig. 1.

1-3 Removing the rear cover

(1) Remove the two screws of Ⓒ shown in Fig. 1.

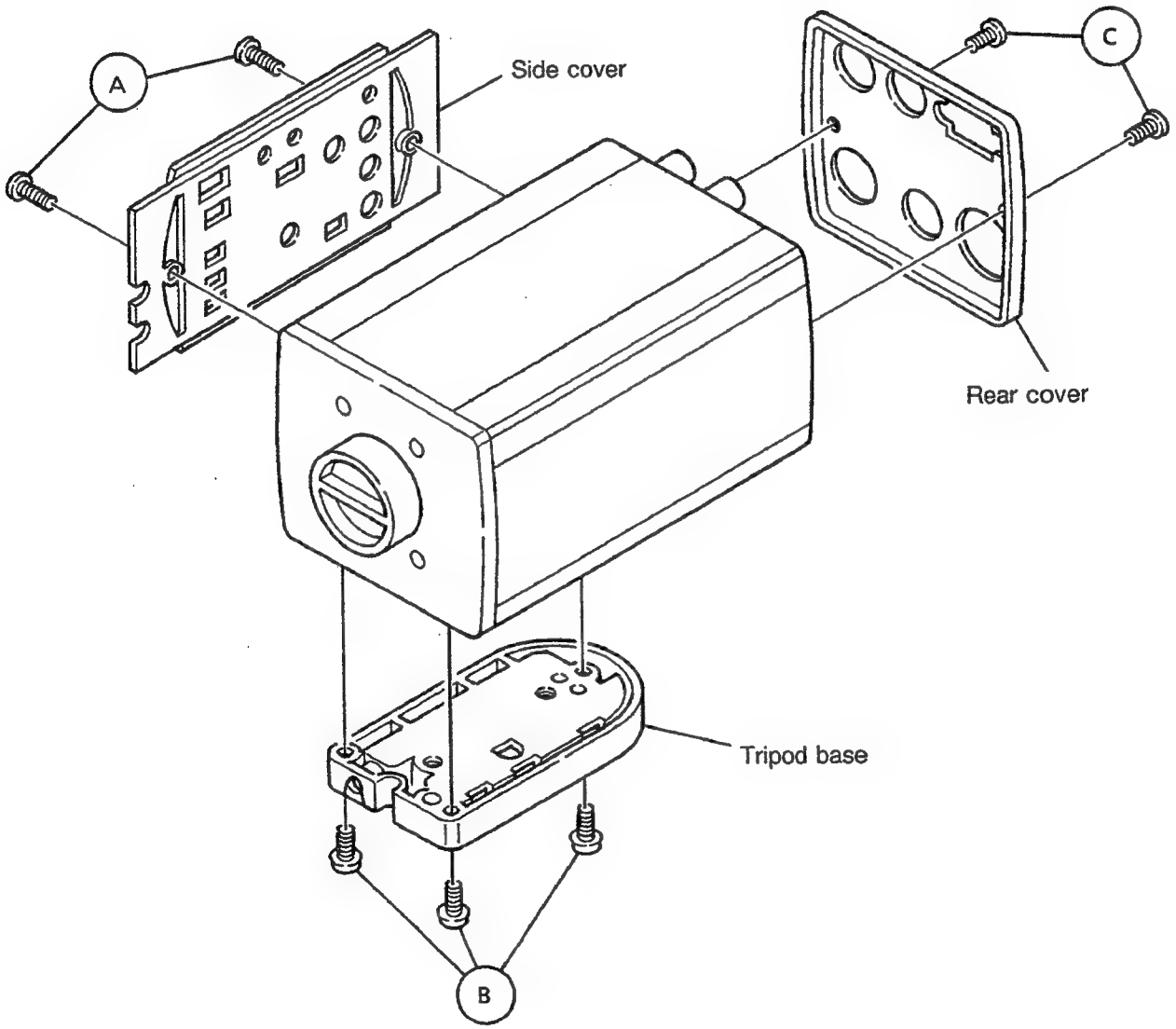


Fig. 1

2. Removing the chassis parts

※ Remove external parts according to the instructions in item 1.

2-1 Removing the aluminium case

(1) Remove the two screws of Ⓘ shown in Fig. 2.
(2) It can be removed by pulling toward the terminal direction.

2-2 Removing the front cover

(1) Remove the four screws of Ⓓ shown in Fig. 2.

2-3 Removing the top frame

(1) Remove the five screws of Ⓕ and two screws of Ⓗ shown in Fig. 2.

2-4 Removing the chassis mount

(1) After removing the top frame the two screws of Ⓔ and remove the connector and wire.

2-5 Removing the bottom frame

(1) Remove the four screws of Ⓖ shown in Fig. 2.

2-6 Removing the terminal ass'y

(1) Removing the connector by just removing the top and bottom frames allows the terminal ass'y to be removed.

2-7 Removing the boards

(1) The MATRIX board can be opened in the outside(arrow) direction by removing the two screws of Ⓗ shown in Fig. 2. The board can be removed by opening further.

Note : To mount the board, tilt the MATRIX board up a little bit and push in both hinge connectors. At this time, make sure to completely push in the hinge connectors.

- The module can be remove earsily since it is connected with the connector.

※ After performing all of the items mentioned above, the mother board can be independently removed from the others by removing the earth wire and connector.

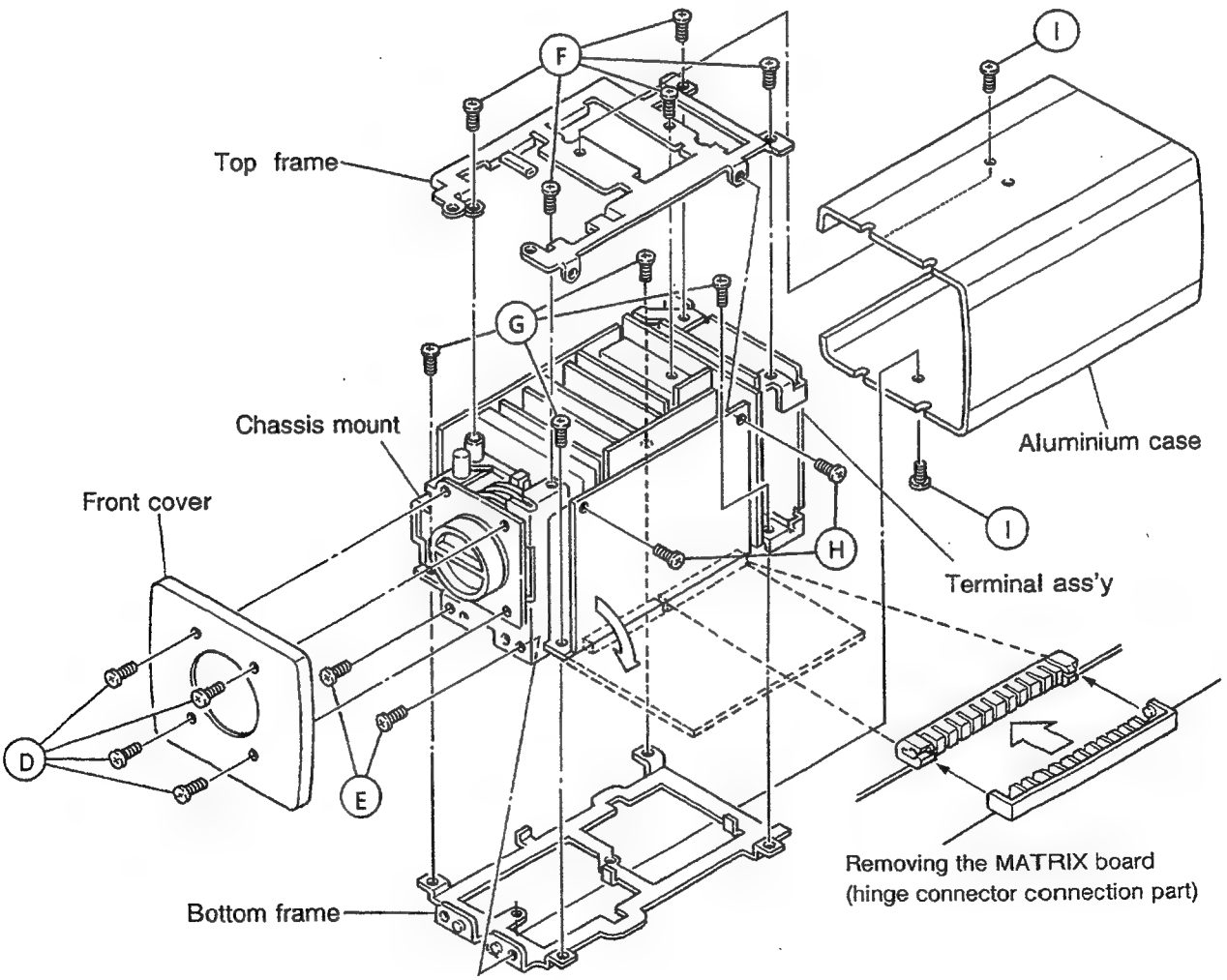


Fig. 2

3. Replacing CCD imager

(1) Remove the imager part from the chassis according to "2-4 Removing the chassis mount"
(2) Remove the screws of Ⓙ shown in Fig. 3 and take out the shield insulator from the imager board.
(3) Remove the imager module. (It can be removed by pulling out/in the IC socket of the CCD.)
(4) Remove the two screws of Ⓚ shown in Fig. 3 and remove the CCD holder.
(5) Remove the two screws of Ⓛ shown in Fig. 3 and remove the CCD imager. Take care at this time not to miss the insulater rubber.
(6) Remouting after replacement can be accomplished by performing the above procedure in reverse.

4. Replacing the optical low pass filter

Note : The optical low pass filter can be removed without removing housing parts such as the aluminium case.

(1) The LPF holder can be removed by removing the dust cover and the two screws of Ⓜ shown in Fig. 3, then the optical low pass filter can be removed.

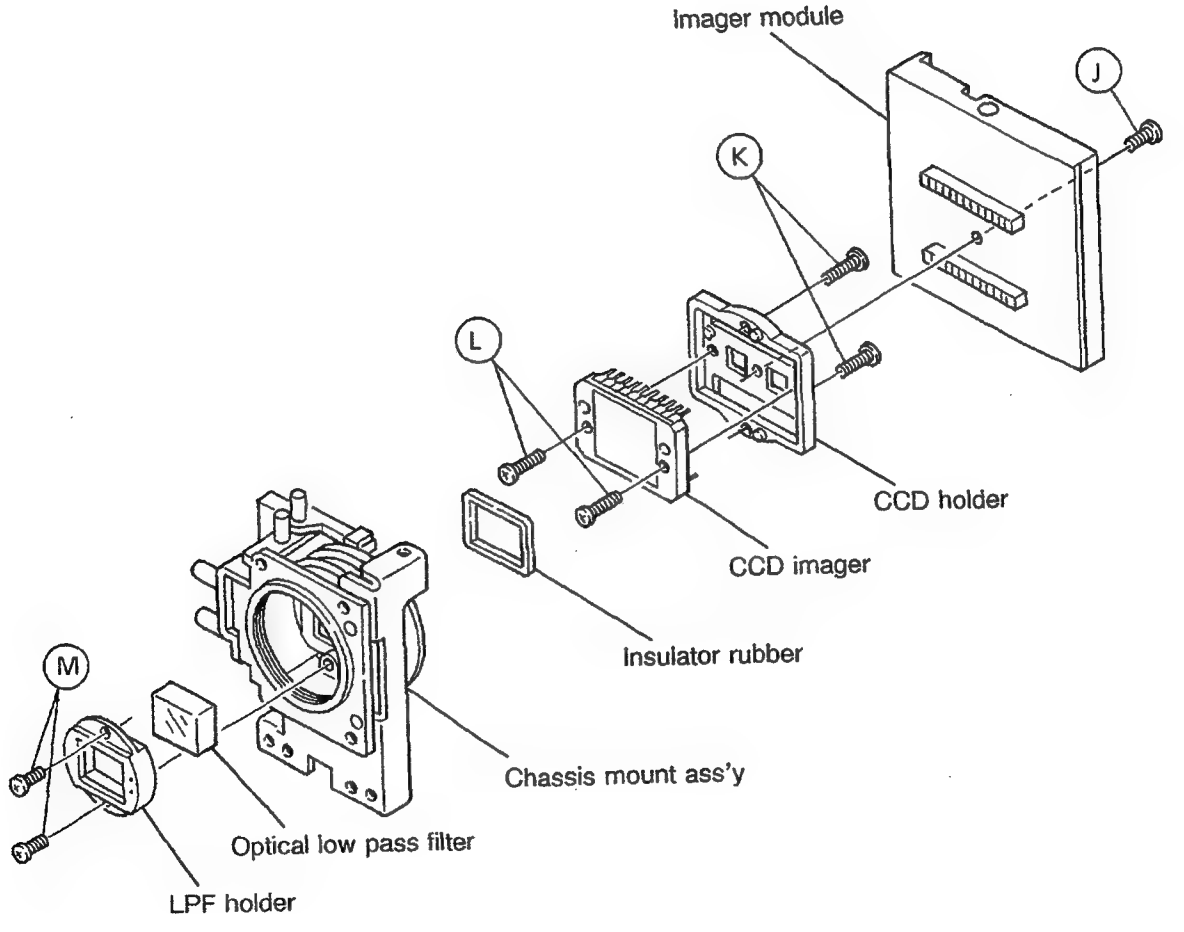


Fig. 3

SERVICE ADJUSTMENT

■TOOLS AND FIXTURES FOR ADJUSTMENT

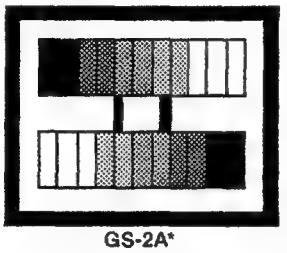
•MEASURING INSTRUMENTS

1. Oscilloscope 1
2. Colour monitor TV(PAL-type) 1
   •To RGB input terminal is recommended.
   Colour temperature : 9,300K
3. Lights .....1 or 2
   Colour temperature : 3,200K
4. Frequency counter 1
5. Digital DC voltmeter(DVM) 1
6. Power supply 1
   Voltage : 12V DC
   AC adaptor (AC-C722 or AC-C724 etc.)
7. Vectorscope (PAL-type) 1
   Used only if mecessary.
8. Waveform monitor (PAL-type) 1
   Used only necessary.
9. SSG or HD·VD generator 1

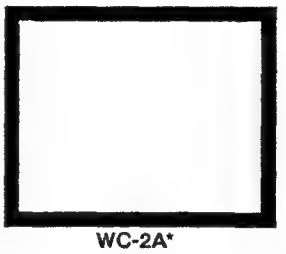
•TOOLS AND FIXTURES

1. PATTERNS (Gray scale Pattern) (White Pattern) (Colour bar Pattern)

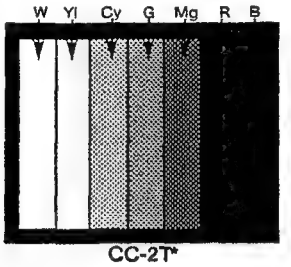
Note:
Reflection-type patterns eventually suffer from drops in signal output level or loss of output uniformity. Periodic replacement is recommended.



GS-2A*
Reflective type($\gamma = 2.2$)

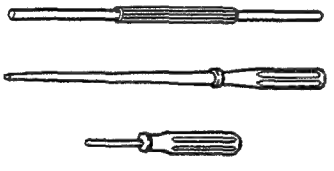


WC-2A*
Reflective type



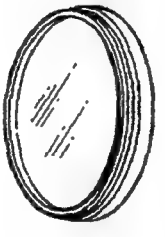
CC-2T*
Transmissive type

2. DRIVERS



Adj. driver

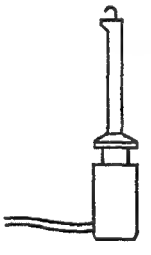
3. COLOUR TEMP. CONVERSION FILTER



W2 + W4 & C2 + C12

KENKO , HOYA filter
filter : W2, W4
filter : C2, C12

4. PIN CLIP



MJ-033*

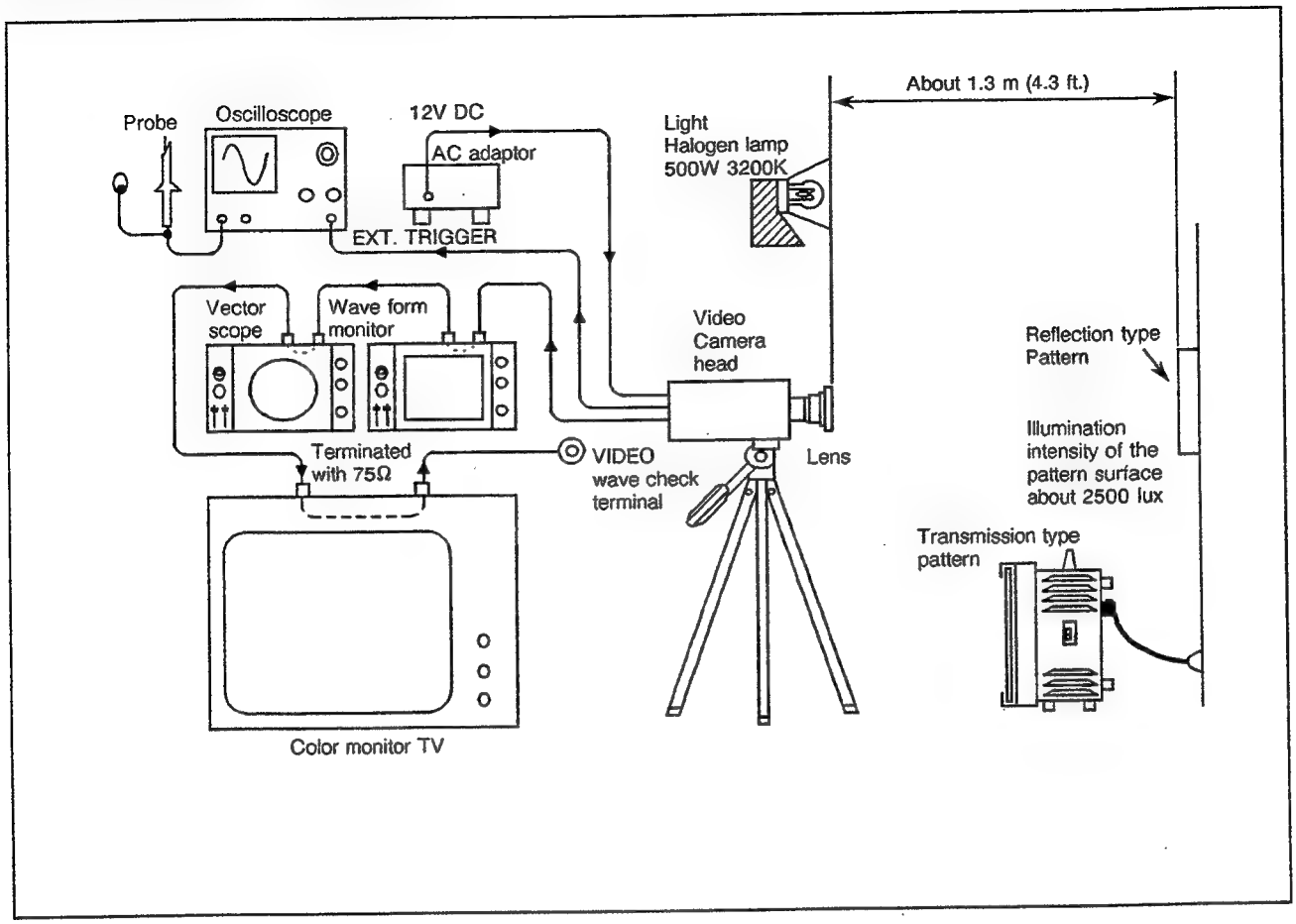
Slightly bending the pin tip facilitates its use.

5. LENS

C-mount lens
- Iris can be controlled manually.
- Lens flange-back should be standard
- Zoom lens is recommended
- F1.4 lens is recommended.

Note:
Parts marked with an asterisk(*) can be ordered from the following section:
PARTS SECTION OF THE SALES ENGINEERING DEPARTMENT,
TELEVISION RECIVER DIVISION.
Parts that is not marked with asterisk(*) are able to get at your side.

■ INSTRUMENT CONNECTION AND SET UP



■ PRIOR TO STARTING ADJUSTMENT

(1) Warming up

Before adjustment, turn on the camera to warm it up for more than 10 minutes so that the camera operation may be stabilized.

(2) Lighting

- Adjust the distance between the light and pattern so that the illumination on the pattern is about 2,500 lux and the illumination over the entire pattern surface is as uniform as possible.
- Correct adjustment will be impossible if the illumination is too high , too low or uneven.

(3) About CCD imager

The CCD image is susceptible to static electricity. The insulator of this element might be damaged if a potential difference is caused by the electrostatic charge carried by clothes or body. Be careful when holding it because it is costly. Use special care in a dry atmosphere in a dry season.

(4) Tripod mounting

When mounting the camera with the external cover remove on a tripod, avoid excessively tightening the rear screw (near center of camera bottom) of the tripod base. (The circuit board may be damaged if too tight.)

If only the front diecast section is not removed, a front to rear difference is produced which prevents proper securing. In this case, be sure to also remove the front diecast section.

■ ADJUSTMENT PROCEDURE

1. Presetting

Before adjustment, preset the following switches .

1) AGC switch	→"FIX"
2) GAIN switch	→"0"
3) WHITE BALANCE switch	→"☼"(halogen)
4) GAMMA switch	→"0.45"
5) DETAIL switch	→"ON"
6) D-SUB OUT switch	→"Y/C"
7) SC COARSE switch	→"1"
8) SHUTTER switch	→"NORM" (OFF)

2. In holding a test pin with a probe, take care set contact with any other pin. The CCD imager will be damaged if some text pins are accidentally connected.

3. EXT. TRIGGER

In adjusting the signal system, extract the trigger signal as required.

H-rate : TP-27 (ID) [MATRIX Board]

V-rate : [I] connector ⑰ Pin [SSG Module]

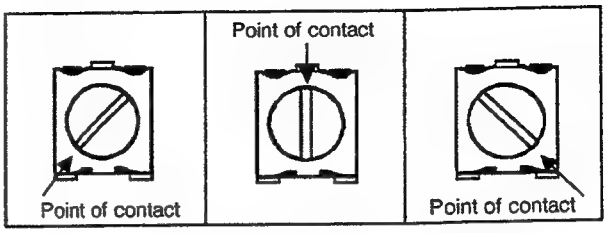
4. JUST SCAN

Unless otherwise specified, apply "just scan" to all pattern adjustments.

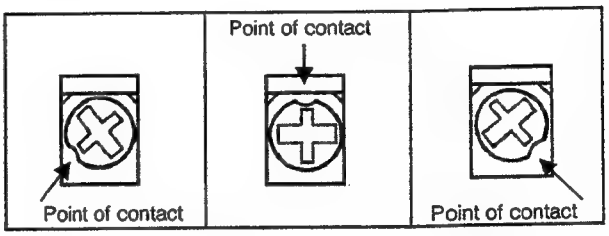
5. Repeat adjustments optimum conditions are established.

6. Chip VR

Chip VR rotating position is designated as shown in the figure below for the convenience of explanation, since the chip VR can be rotated 360°.



Full-counter-clockwise | Mechanical center | Full-clockwis

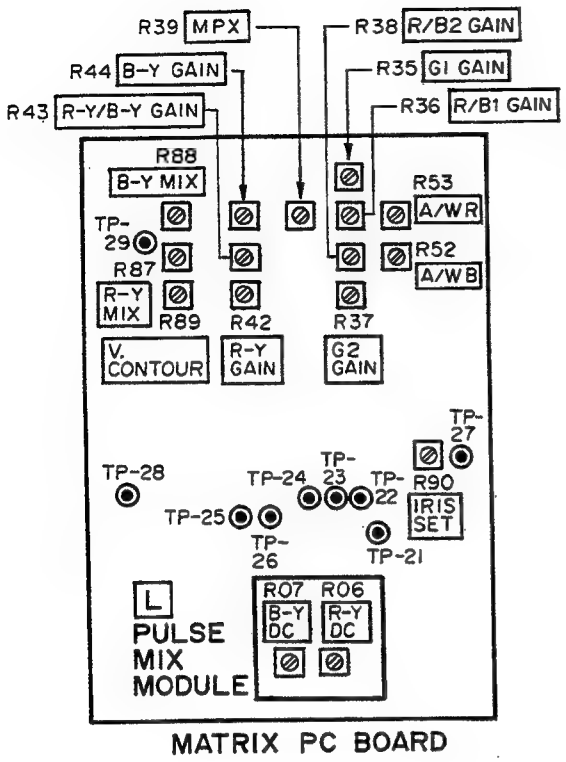


Full-counter-clockwise | Mechanical center | Full-counter-clockwise

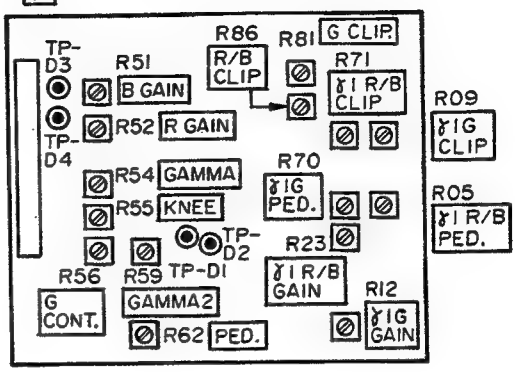
7. No Adjustment of unspecified VRs

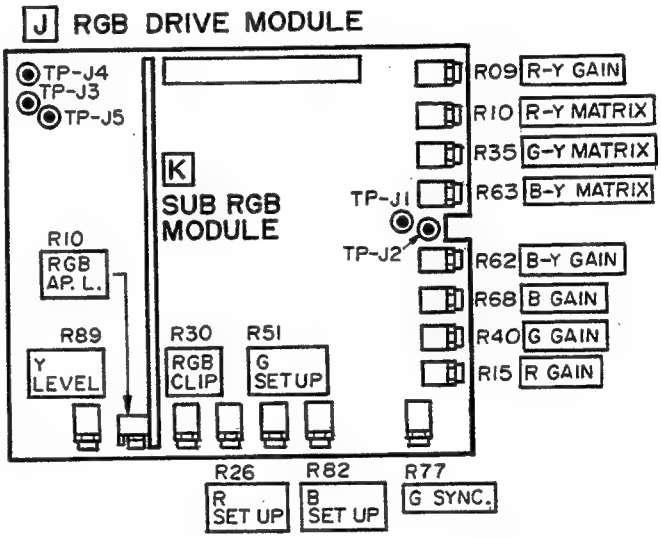
Never rotate VRs other than those specified by this SERVICE MANUAL.

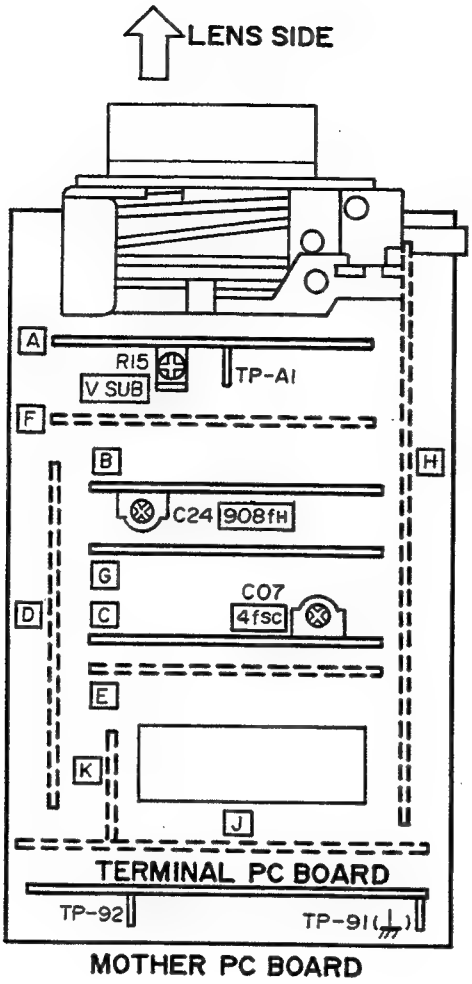
ADJUSTMENT LOCATIONS

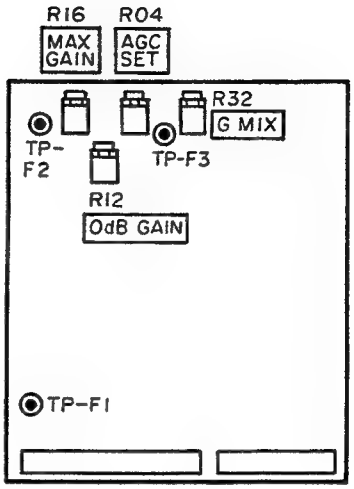


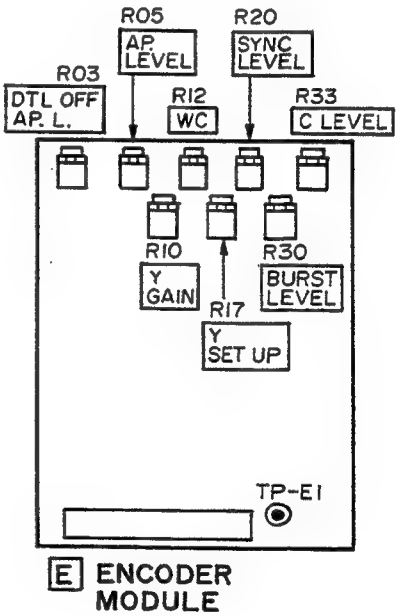
MATRIX PC BOARD

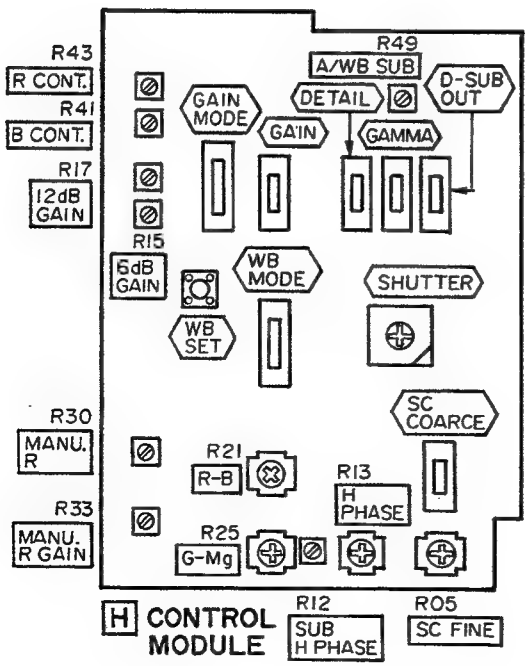





LENS SIDE
A
R15
V SUB
TP-A1
F
B
H
C24 908fH
G
C07
4fsc
D
C
E
K
J
TERMINAL PC BOARD
TP-92
TP-91
MOTHER PC BOARD


R16
MAX GAIN
R04
AGC SET
R32
G MIX
TP-F2
TP-F3
R12
0dB GAIN
TP-F1
F CDS MODULE

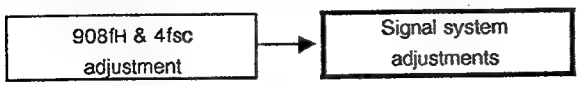

R05
AP. LEVEL
R20
SYNC LEVEL
R03
DTL OFF AP. L.
R12
WC
R33
C LEVEL
R10
Y GAIN
R30
BURST LEVEL
R17
Y SET UP
TP-E1
E ENCODER MODULE


R43
R CONT.
R41
B CONT.
R17
12dB GAIN
R15
6dB GAIN
R49
A/WB SUB
GAIN MODE
DETAIL
D-SUB OUT
GAIN
GAMMA
WB MODE
WB SET
SHUTTER
SC COARCE
R30
MANU. R
R21
R-B
R13
H PHASE
R33
MANU. R GAIN
R25
G-Mg
H CONTROL MODULE
R12
SUB H PHASE
R05
SC FINE

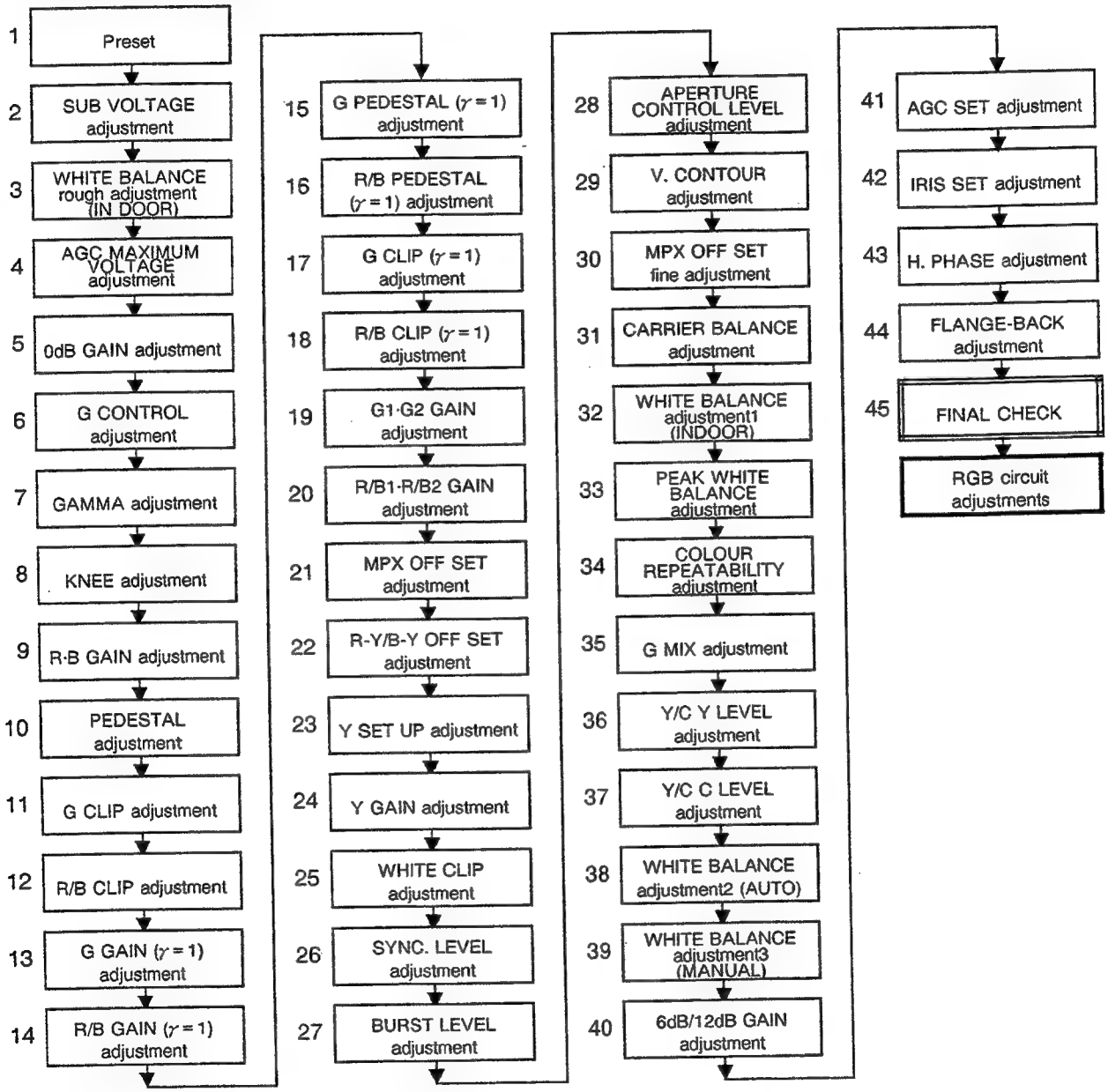
■ ADJUSTING STEP

1. SSG(Synchronous Signal Generator) adjustment

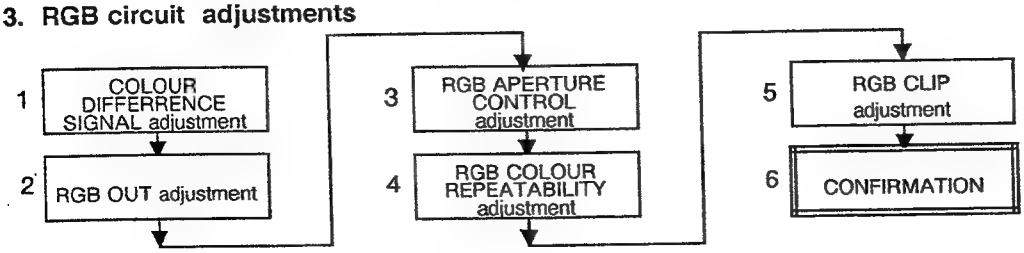
Note : Normally, this adjustment is not necessary. Proceed to the next "Signal system adjustments" directly.



2. Signal system adjustments



3. RGB circuit adjustments



1. SSG (Synchronous signal generator) ADJUSTMENT

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
1	908fH & 4fsc adjustment	**This adjustment is required only when replacing peripheral devices which relate to SSG IC and this adjustment. Usually, proceed to the next signal system adjustment by skipping this adjustment.**			
		Frequency counter DC voltmeter SSG or HD·VD generator	TG Module F connector ⑤pin SSG Module I connector ⑥pin	C24(908fH) [TG Module] C07(4fSC) [SSG Module]	1. Connect the frequency counter with **F connector ⑤pin TG module** and set to **14.1875MHz ± 10Hz** using **C24(908fH)**. 2. Insert the signal of SSG in the RGB·Y/C·SYNC in/out terminal and apply the H·V lock. If the H lock is at a distance at this time, apply the H lock with **C07(4fSC)**. 3. Connect the DC voltmeter with **⑥pin of the SSG module** and set to **17.734475MHz ± 10Hz** using **C07(4fSC)**.

2. SIGNAL SYSTEM ADJUSTMENTS

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
1	Preset	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R32(G MIX) [CDS Module] R59(GAMMA-2) R55(KNEE) R81(G CLIP) R86(R/B CLIP) R70(γ1 G PED) R09(γ1 G CLIP) R05 (γ1 R/B PED) R71 (γ1 R/B CLIP) [PROCESS Module] R12(W CLIP) [ENCODER Module]	※ Set the following presets before starting the adjustment. 1) AGC →FIX 2) GAIN →0 3) WHITE BALANCE →☼ 4) GAMMA →0.45 5) DETAIL →ON 6) D-SUB OUT →Y/C 7) SC COARSE →1 8) SHUTTER →NORM(OFF) ■Release the following items Fully open the iris (open) and connect the oscilloscope to TP-92, then adjust so that the amplitude of the waveform becomes maximum. •G MIX →R32(G MIX) •GAMMA 2 →R59(GAMMA-2) •KNEE →R55(KNEE) •G CLIP →R81(G CLIP) •R/B CLIP →R86(R/B CLIP) •G PEDESTAL(γ=1) →R70(γ1 G PED) •G CLIP(γ=1) →R09(γ1 G CLIP) •R/B PEDESTAL(γ=1) →R05(γ1 R/B PED) •R/B CLIP(γ=1) →R71(γ1 R/B CLIP) •WHITE CLIP →R12(W CLIP)
2	SUB VOLTAGE adjustment	**Since this adjustment is required when replacing the CCD imager, normally proceed to the next adjustment.**			
		DC voltmeter	TP-A1 (CCD output) [IMAGER Module]	R15(VSUB) [IMAGER Module]	1. Connect the DC voltmeter to TP-A1 and adjust with R15(VSUB) so that the imager's voltage becomes the specified value as shown in figure 2-1. • Since the voltage indications are indicated on the rear side of the imager, calculate the numeric value by referring to table 1.

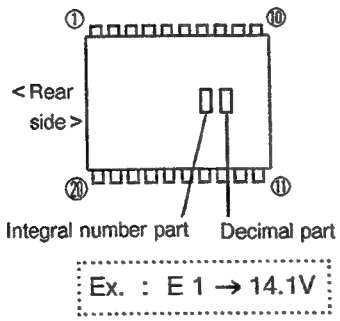


Fig. 2-1

Code	A	B	C	D	E	F	G	H	I	J
Numeric value	10	11	12	13	14	15	16	17	18	19

Table 1 Code correspondence list for integral number

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
3	WHITE BALANCE rough adjustment (INDOOR)	**Because this adjustment is performed only when replacing the circuit board, normally proceed with the following adjustment.**			
		DC voltmeter	M connector ③pin & ④pin [CONTROL Module]	R43(R CONT.) R41(B CONT.) [CONTROL Module]	1. Connect the DC voltmeter to ③pin of the M connector. 2. Adjust to 2.55V with R43(R CONT.). 3. Connect the DC voltmeter to ④pin of the M connector. 4. Adjust to 2.75V by R41(B CONT.).
4	AGC MAXIMUM VOLTAGE adjustment	DC voltmeter	TP-F1 [CDS Module]	R16 (MAX GAIN) [CDS Module]	1. Connect the DC voltmeter to TP-F1 and adjust to 2.8V with R16(MAX GAIN).
5	0dB GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-F2 TP-F3 [CDS Module]	R12(0dB GAIN) [CDS Module]	• Adjust the iris knob so that TP-F2(CCD output)becomes 150mV as shown in figure 5-1. 1. Connect the oscilloscope to TP-F3 and adjust with R12(0dB GAIN) so that 300mV is attained. (Figure 5-2)
6	G CONTROL adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-F2 TP-D1 [PROCESS Module]	R56(G CONT) [PROCESS Module]	• Set the iris to CCD output = 150mV. 1. Connect the oscilloscope to TP-D1 and adjust with R56(G CONT) so that 250mV is attained. (Figure 6-1)

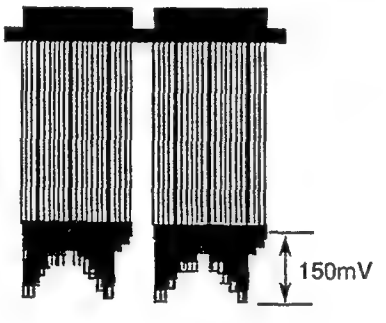


Fig. 5-1

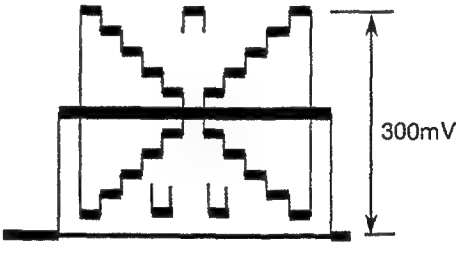
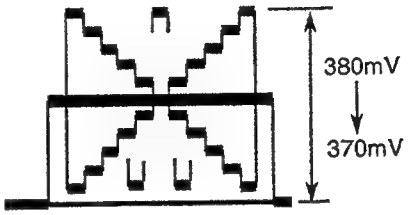
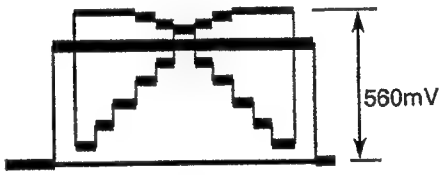
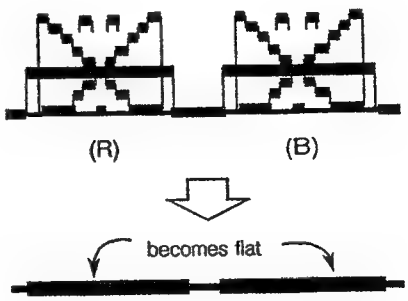
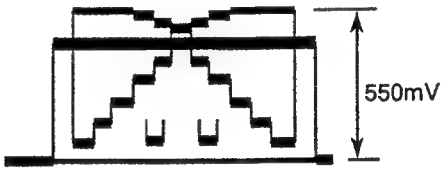
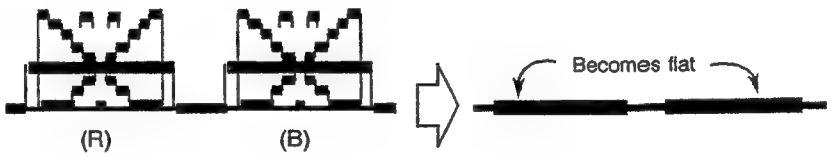
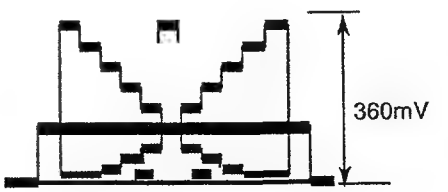
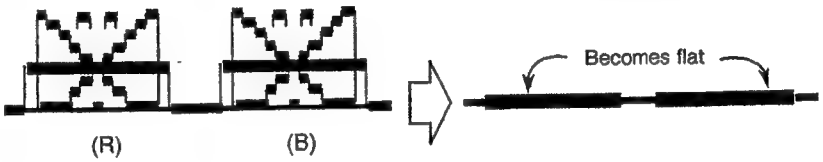
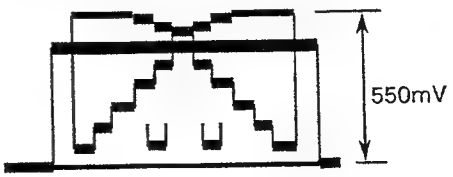


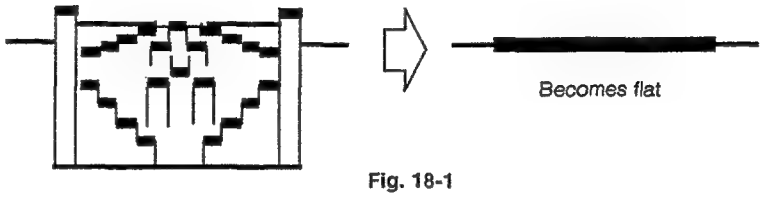
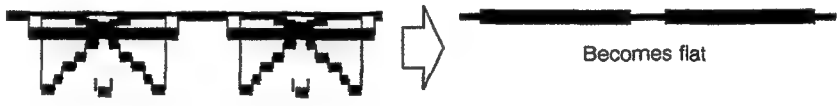
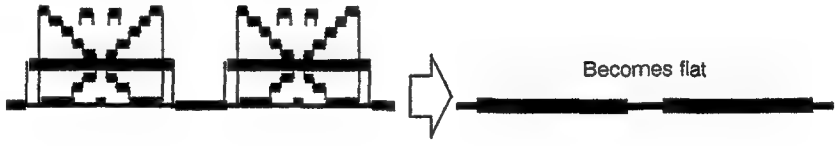
Fig. 5-2

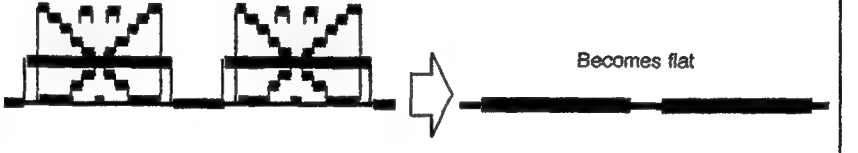
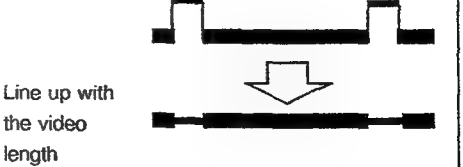
Fig. 6-1

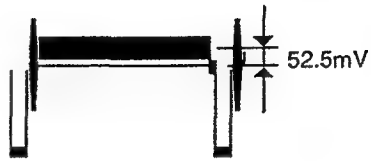
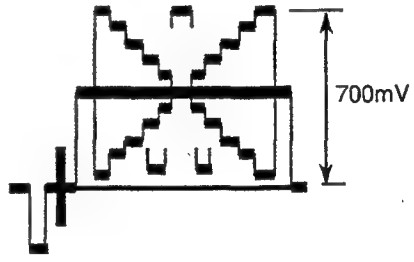
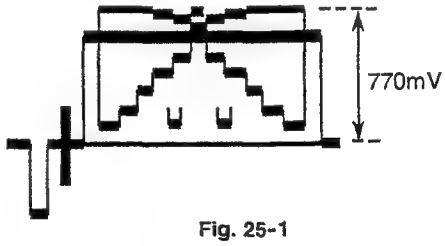
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
7	GAMMA adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 [PROCESS Module]	R54(GAMMA) R59 (GAMMA-2) [PROCESS Module]	• Set the iris to CCD output = **150mV**. 1. Connect the oscilloscope to **TP-D4** and adjust with **R54(GAMMA)** so that **380mV** is attained. (Figure 7-1) 2. Next, adjust with **R59(GAMMA-2)** so that **370mV** is attained.  **Fig. 7-1**
8	KNEE adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 [PROCESS Module]	R55(KNEE) [PROCESS Module]	• Fully open the iris. (So that more than **600mV** is attained in the release status.) 1. Connect the oscilloscope to **TP-D4** and adjust with **R55(KNEE)** so that **560mV** is attained. (Figure 8-1)  **Fig. 8-1**
9	R·B GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 TP-D3 [PROCESS Module]	R52(R GAIN) R51(B GAIN) [PROCESS Module]	• Set the iris to CCD output = **150mV**. 1. Connect CH1 of the oscilloscope to **TP-D4** and connect CH2 of the oscilloscope to **TP-D3**. 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust the red waveform with **R52(R GAIN)** and **R51(B GAIN)** so that the waveform becomes flat.  **Fig. 9-1**

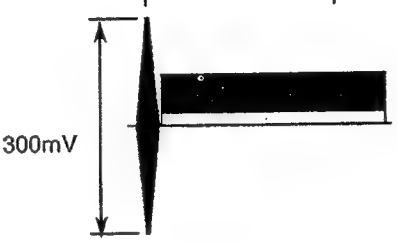
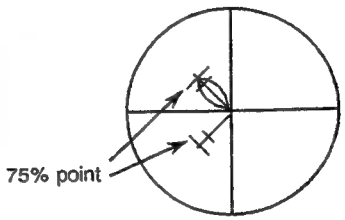
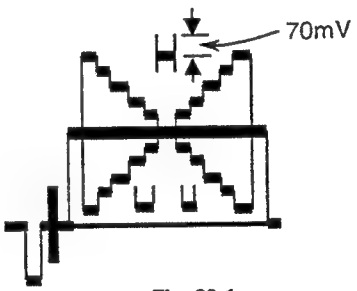
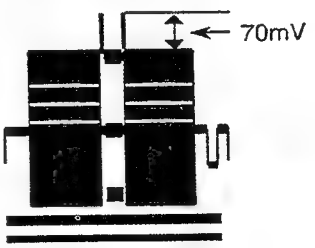
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
10	PEDESTAL adjustment	Oscilloscope (H-rate 10:1)	TP-D4 [PROCESS Module]	R57(PED.) [PROCESS Module]	• Close the iris with the lens cap. 1. Connect the oscilloscope to TP-D4 and adjust with R57(PED.) so that 40mV is attained. (Figure 10-1)  Fig. 10-1
11	G CLIP adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 [PROCESS Module]	R81(G CLIP) [PROCESS Module]	• Fully open the iris. 1. Connect the oscilloscope to TP-D4 and adjust with R81(G CLIP) so that 550mV is attained. (Figure 11-1)  Fig. 11-1
12	R/B CLIP adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 TP-D3 [PROCESS Module]	R86(R/B CLIP) [PROCESS Module]	• Fully open the iris. 1. Connect CH1 of the oscilloscope to TP-D4 and connect CH2 of the oscilloscope to TP-D3. 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust with R86(R/B CLIP) so that the waveform becomes flat. (Figure 12-1)  Fig. 12-1
13	G GAIN (γ = 1) adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 [PROCESS Module]	R12 (γ1 G GAIN) [PROCESS Module]	• Set the iris to CCD output = 150mV. • Set the GAMMA switch to 1. 1. Connect the oscilloscope to TP-D4 and adjust with R12(γ1 G GAIN) so that 360mV is attained. (Figure 13-1)  Fig. 13-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
14	R/B GAIN (γ=1) adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 TP-D3 [PROCESS Module]	R23 (γ1 R/B GAIN) [PROCESS Module]	• Set the iris to CCD output = 150mV. • Set the GAMMA switch to 1. 1. Connect CH1 of the oscilloscope to TP-D4 and connect CH2 of the oscilloscope to TP-D3. 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust with R23(γ1 R/B GAIN) so that the waveform becomes flat. (Figure 14-1)  Fig. 14-1
15	G PEDESTAL (γ=1) adjustment	Oscilloscope (H-rate 10:1)	TP-D4 [PROCESS Module]	R70 (γ1 G PED.) [PROCESS Module]	• Close the iris with the lens cap. • Set the GAMMA switch to 1. 1. Connect the oscilloscope to TP-D4 and adjust with R70(γ1 G PED) so that 40mV is attained. (Figure 15-1)  Fig. 15-1
16	R/B PEDESTAL (γ=1) adjustment	Oscilloscope (H-rate 10:1)	TP-D4 TP-D3 [PROCESS Module]	R05 (γ1 R/B PED.) [PROCESS Module]	• Close the iris with the lens cap. • Set the GAMMA switch to 1. 1. Connect CH1 of the oscilloscope to TP-D4 and connect CH2 of the oscilloscope to TP-D3. 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 1. Adjust the waveform with R05(γ1 R/B PED) so that it becomes flat. (Figure 16-1)  Fig. 16-1
17	G CLIP (γ=1) adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 [PROCESS Module]	R09 (γ1 G CLIP) [PROCESS Module]	• Fully open the iris. • Set the GAMMA switch to 1. 1. Connect the oscilloscope to TP-D4 and adjust with R09(γ1 G CLIP) so that 550mV is attained. (Figure 17-1)  Fig. 17-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
18	R/B CLIP (γ=1) adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D4 TP-D3 [PROCESS Module]	R071 (γ1 R/B CLIP) [PROCESS Module]	• Fully open the iris • Set the **GAMMA** switch to **1.** 1. Connect CH1 of the oscilloscope to **TP-D4** and connect CH2 of the oscilloscope to **TP-D3.** 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust with **R71(γ1 R/B CLIP)** so that the red waveform becomes flat. (Figure 18-1)  **Fig. 18-1**
19	G1·G2 GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-21 TP-22 TP-23 [MATRIX Board]	R35(G1 GAIN) R37(G2 GAIN) [MATRIX Board]	• Setting for the iris is CCD output = **150mV.** • Set the **GAMMA** switch to **0.45** 1. Connect CH1 of the oscilloscope to **TP-21** and connect CH2 of the oscilloscope to **TP-22.** 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust with **R35(G1 GAIN)** so that the waveform becomes flat. (Figure 19-1) 4. Connect CH2 of the oscilloscope to **TP-23.** 5. Adjust with **R37(G2 GAIN)** so that the waveform becomes flat. (Figure 19-2)  **Fig. 19-1**  **Fig. 19-2**

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
20	R/B1·R/B2 GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-25 TP-26 TP-24 [MATRIX Board]	R36(R/B1 GAIN) R38(R/B2 GAIN) [MATRIX Board]	• Setting for the iris is CCD output = **150mV.** 1. Connect CH1 of the oscilloscope to **TP-25** and connect CH2 of the oscilloscope to **TP-26.** 2. Invert CH2 waveform (INV) and add (ADD) to CH1. 3. Adjust with **R36(R/B1 GAIN)** so that the waveform becomes flat. (Figure 20-1) 4. Connect CH2 of the oscilloscope to **TP-24.** 5. Adjust with **R38(R/B2 GAIN)** so that the waveform becomes flat. (Figure 20-2)  Fig. 20-1  Fig. 20-2
21	MPX OFF SET adjustment	Oscilloscope (H-rate 10:1)	TP-28 [MATRIX Board]	R39(MPX) [MATRIX Board]	• Close the iris with the lens cap. 1. Connect the oscilloscope to **TP-28** and adjust with **R39(MPX)** so that every 1H video length differentiation  Fig. 21-1
22	R-Y/B-Y OFF SET adjustment	Oscilloscope (H-rate 10:1)	TP-28 TP-29 [MATRIX Board]	R06(R-Y DC) R07(B-Y DC) [PULSE MIX Module]	• Close the iris with the lens cap. 1. Connect the oscilloscope to **TP-28** and adjust with **R06(R-Y DC)** so that the blanking section lines up with the video length level. (Figure 22-1) 2. Next, connect the oscilloscope to **TP-29** and adjust with **R07(B-Y DC)** so that the blanking section lines up with the video length level. (Figure 22-1)  Fig. 22-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
23	Y SET UP adjustment	Oscilloscope (H-rate 10:1)	TP-92 (VIDEO OUT) [TERMINAL Board]	R17(Y SET UP) [ENCODER Module]	• Close the iris with the lens cap. 1. Connect the oscilloscope to **TP-92(VIDEO OUT)** and adjust with **R17(Y SET UP)** so that **52.5mV** is attained. (Figure 23-1)  **Fig. 23-1**
24	Y GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R10(Y GAIN) [ENCODER Module]	• Set the iris to CCD output = **150mV.** 1. Connect the oscilloscope to **TP-92** and adjust with **R10(Y GAIN)** so that the image output becomes **700mV.** (Figure 24-1)  **Fig. 24-1**
25	WHITE CLIP adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R12(W CLIP) [ENCODER Module]	• Fully open the iris. 1. Connect the oscilloscope to **TP-92** and adjust with **R12(W CLIP)** so that the image output's white peak becomes **770mV.** (Figure 25-1)  **Fig. 25-1**
26	SYNC. LEVEL adjustment	Oscilloscope (H-rate 10:1)	TP-92 (VIDEO OUT) [TERMINAL Board]	R20 (SYNC LEVEL) [ENCODER Module]	• Close the iris with the lens cap. 1. Connect the oscilloscope to **TP-92** and adjust with **R20(SYNC LEVEL)** so that **300mV** is attained. (Figure 26-1)  **Fig. 26-1**

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
27	BURST LEVEL adjustment	Oscilloscope (H-rate 10:1) Vectorscope	TP-92 (VIDEO OUT) [TERMINAL Board]	R30 (BURST LEVEL) [ENCODER Module]	• Close the iris with the lens cap. **[When using the oscilloscope]** 1. Connect the oscilloscope to **TP-92** and adjust with **R30(BURST LEVEL)** so that **300mV** is attained. (Figure 27-1) **[When using the vectorscope]** 1. Adjust with **R30** so that the burst level is at the 75% point. (Figure 27-2)  Fig. 27-1  Fig. 27-2
28	APERTURE CONTROL LEVEL adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R05(AP.L.) R03 (DTL-OFF AP.L.) [ENCODER Module]	• Set the iris to the image output = **560mV**. 1. Connect the oscilloscope to **TP-92** and adjust with **R05(AP.L.)** so that the midrange gray scale's white peak degree of overshoot becomes **70mV** . (Figure 28-1)  Fig. 28-1 2. Turn the **DETAIL** switch **OFF.** 3. Adjust with **R03(DTL-OFF AP.L.)** so that the midrange scale white peak overshoot is stopped at the point just before it occurs.
29	V CONTOUR adjustment	Oscilloscope (V-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R89 (V CONTOUR) [MATRIX Board]	• Set the iris to image output = **560mV.** • Set the **DETAIL** switch to **ON.** 1. Connect the oscilloscope to **TP-92** and adjust with **R89(V CONTOUR)** so that the midrange gray scale's white peak degree of overshoot becomes **70mV.** (Figure 29-1)  Fig. 29-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
30	MPX OFF SET fine adjistment	Oscilloscope (H-rate 10:1) Vectorscope	TP-92 (VIDEO OUT) [TERMINAL Board]	R39(MPX) [MATRIX Board]	• Close the iris with the lens cap. • Turn to the **GAMMA** switch to **1.** **[When using the vectorscope]** 1. Use **R39(MPX)** to adjust so that the balls of the carrier overrap. **[When using the oscilloscope]** 1. Connect the oscilloscope to **TP-92** and adjust with **R39** so that the flicker of set up level becomes as small as possible. (figier 30-2)
31	CARRIER BALANCE adjustment	Oscilloscope (H-rate 10:1) Vectorscope	TP-92 (VIDEO OUT) [TERMINAL Board]	R06(R-Y DC) R07(B-Y DC) [PULSE MIX Module] R05 (γ1 R/B PED) [MATRIX Board]	•Close the iris with the lens cap. **[When using the vectorscope]** 1 Adjust with **R06(R-Y DC)** so that the carrier comes over the B-Y axis, and adjust with **R07(B-Y DC)** so that the carrier comes to the intersecting point of the R-Y axis and R-Y axis. (Figure 31-1) 2. Switch the **GAMMA** switch over to **1.** 3. Adjust with **R05(γ1 R/B PED)** so that the carrier comes to the intersecting point of the R-Y axis and R-Y axis. (Figure 31-1) **[When using the oscilloscope]** 1. Connect the oscilloscope to **TP-92** and adjust with **R06** and **R07** so that the carrier becomes minimal. (Figure 31-2) 2. Switch the **GAMMA** switch over to **1.** 3. Adjust with **R05(γ1 R/B PED)** so that the carrier becomes minimal. (Figure 31-2) • After adjustment, return the **GAMMA** switch to **0.45.**

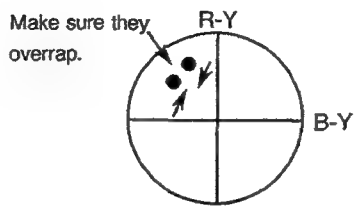


Fig. 30-1

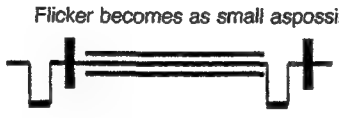
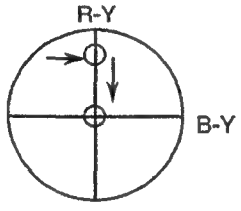


Fig. 30-2



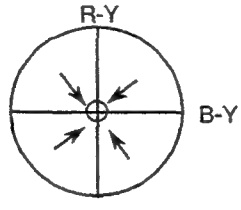


Fig. 31-1

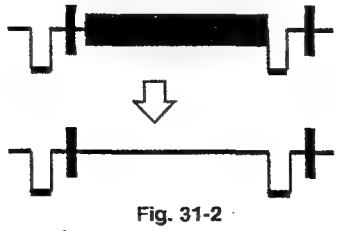
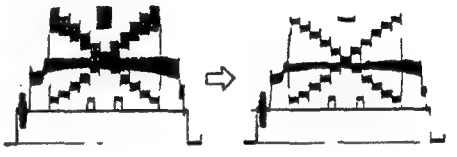
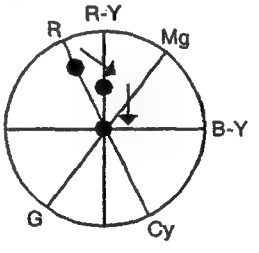
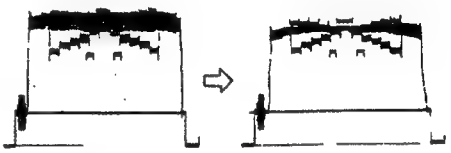
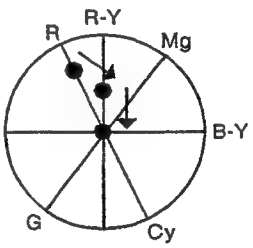


Fig. 31-2

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
32	WHITE BALANCE adjustment1 (INDOOR)	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R52(R GAIN) R51(B GAIN) R23 (γ1 R/B GAIN) [PROCESS Module]	• Set TP-92 to 714mV with the iris knob. **[When using the oscilloscope]** 1. Connect to TP-92 and adjust with R52(R GAIN) and R51(B GAIN) so that the gray scale mid-section's carrier becomes minimum. (Figure 32-1) 2. Switch the GAMMA switch over to 1. 3. Adjust with R23(γ1 R/B GAIN) so that the gray scal mid-section becomes minimum. (Figure 32-1)  Fig. 32-1 **[When using the vectorscope]** 1. Line up with R52 and R51 so that the carrier becomes minimum and comes within the center of the vectorscope. 2. Switch the GAMMA switch over to 1. 3. Adjust with R23 so that the carrier becomes minimum and comes within the center of the vectorscope. (Figure 32-2)  Fig. 32-2 • After adjustment, return the GAMMA switch to 0.45.

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
33	PEAK WHITE BALANCE adjustment	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R86(R/B CLIP) R71 (γ1 R/B CLIP) [PROCESS Module]	• Fully open the iris. **[When using the oscilloscope]** 1. Adjust with **R86(R/B CLIP)** so that the gray scale peak-section's carrier becomes minimum. (Figure 33-1) 2. Switch the **GAMMA** switch over to **1.** 3. Adjust with **R71(γ1 R/B CLIP)** so that the gray scale peak-section becomes minimum. (Figure 33-1)  **Fig. 33-1** **[When using the vectorscope]** 1. Line up with **R86** so that the carrier becomes minimum and comesto the center of the vectorscope. (Figure 33-2) 2. Switch the **GAMMA** switch over to **1.** 3. Line up with **R71** so that the carrier becomes minimum and comes to the center of the vectorscope. (Figure 33-2)  **Fig. 33-2** • After adjustment, return the **GAMMA** switch to **0.45.**

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
34	COLOUR REPEATABILITY adjustment	Oscilloscope (H-rate 10:1) Vectorscope Colour bar pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R87(R-Y MIX) R88(B-Y MIX) R42(R-Y GAIN) R44 (B-Y GAIN) [MATRIX Board]	• Play the colour bar and adjust the white with the iris knob so that TP-92 becomes 700mV. 1. Perform the various adjustments with R87(R-Y MIX), R88(B-Y MIX), R42(R-Y GAIN) and R44(B-Y GAIN) so that the red signal alignment to point (A), and the yellow signal alignment to point (B) are obtained. (Figure 34-1) Note : When unable to use the vectorscope, play the colour bar, while observing the TV monitor and adjust to the optimum colour repeatability.
35	G MIX adjustment	Oscilloscope (H-rate 10:1) Colour bar pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R32(G MIX) [CDS Module]	• Play the colour bar and adjust the white with the iris knob so that TP-92 becomes 700mV. 1. Adjust with R32(G MIX) so that the flickering of the red portion of the colour bar is eliminated. (Figure 35-1)
36	Y/C Y LEVEL adjustment	Oscilloscope (H-rate 10:1) Colour bar pattern	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J4 [RGB DRIVE Module]	R89(Y LEVEL) [RGB DRIVE Module]	• Comfirm that the D-SUB OUT switch is Y/C. • Play the colour bar and adjust the white with the iris knob so that TP-92 becomes 700mV. 1. Connect the oscilloscope to TP-J4 and adjust with R89(Y LEVEL) so that 700mV is attained. (Figure 36-1)

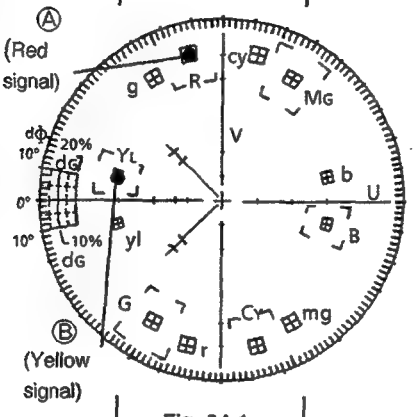


Fig. 34-1

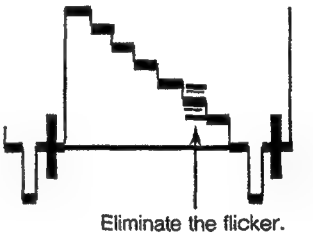


Fig. 35-1

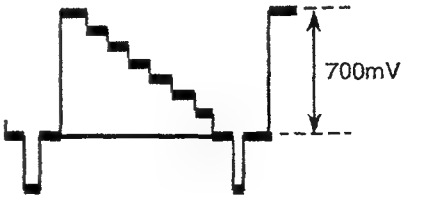
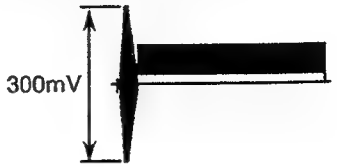
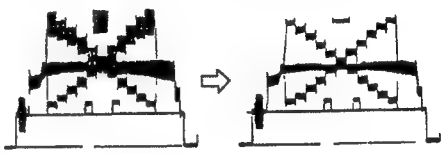
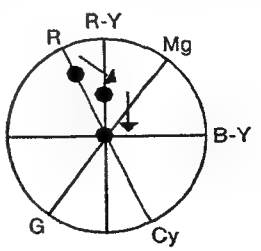
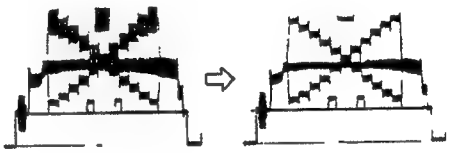
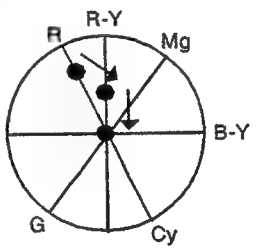
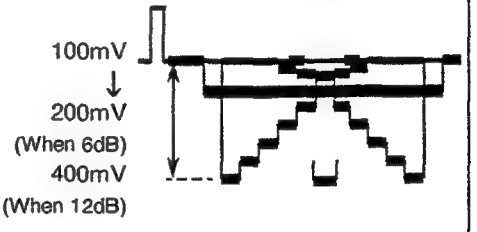
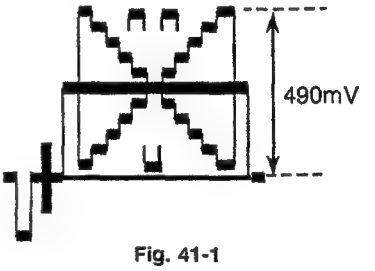
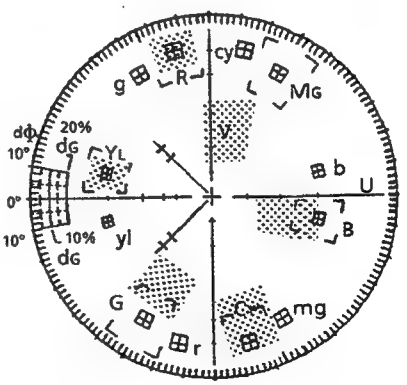


Fig. 36-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
37	Y/C C LEVEL adjustment	Oscilloscope (H-rate 10:1)	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J5 [RGB DRIVE Module]	R33(C LEVEL) [ENCODER Module]	• Comfirm yhat the **D-SUB OUT** switch is **Y/C.** 1. Connect the oscilloscope to **TP-J5** and adjust with **R33(C LEVEL)** so that the burst signal becomes **300mV.** (Figure 37-1)  **Fig. 37-1**
38	WHITE BALANCE adjustment2 (AUTO)	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern Colour temperature transformation filter W4 + W2	TP-92 (VIDEO OUT) [TERMINAL Board]	R52(A/W B) R53(A/W R) [MATRIX Board] R49 (A/W R SUB) [CONTROL Module]	• Switch the **WHITE BALANCE** switch over to **AUTO** position. • Install the colour temperature transformer filter to the front of the lens. • Adjust **TP-92** with the iris knob so that **700mV** is attained. • Rotate **R53(A/W R)** completely to the left. **[When using the oscilloscope]** 1. Adjust with **R52(A/W B)** and **R49(A/W R SUB)** so that, when the white balance switch is pressed, the mid-range gray scale becomes minimal. (Figure 38-1) 2. Remove the colour temperature transformer filter and adjust with **R53(A/W R)** so that, when the **WHITE BALANCE SET** switch is pressed, the mid-range gray scale becomes minimal.  **Fig. 38-1** **[When using the vectorscope]** 1. Align with **R52** and **R49** so that the carrier becomes minimal and comes to the center of the vectorscope when the **WHITE BALANCE SET** switch is pressed. (Figure 38-2) 2. Remove the colour temperature transformation filter and align with **R53** so that the carrier becomes minimal and comes to the center of the vectorscope when the white balance switch is pressed.  **Fig. 38-2**

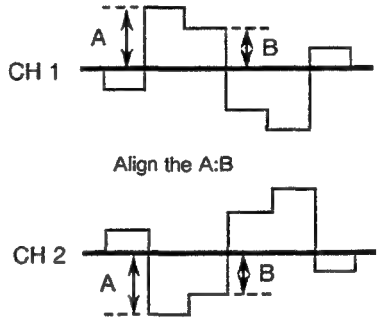
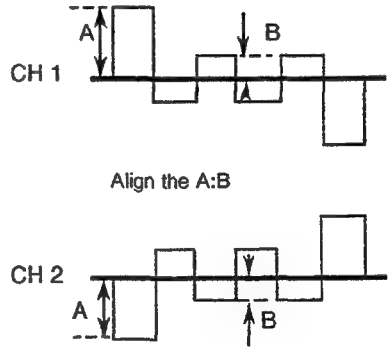
No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
39	WHITE BALANCE adjustment3 (MANUAL)	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern Colour temperature transformation filter C12 + C2	TP-92 (VIDEO OUT) [TERMINAL Board]	R25(G-Mg) R21(R-B) R33 (MANU. R GAIN) R30 (MANU.R) [CONTROL Module]	• Switch the **WHITE BALANCE** switch over to **MANU** position. • Install the colour temperature transformer filter on the front of the lens. • Adjust **TP-92** with the iris knob so that **700mV** is attained. • Rotate **R25(G-Mg)** to the mechanical center. • Rotate **R33(MANU. R GAIN)** to the mechanical center. **[When using the oscilloscope]** 1. Adjust with **R21(R-B)** and **R30(MANU R)** so that the gray scale mid-range carrier becomes minimum. (Figure 39-1) 2. Remove the colour temperature transformation filter and adjust with **R21** and **R33** so that the gray scale mid-range carrier becomes minimum.  **Fig. 39-1** **[When using the vectorscope]** 1. Align with **R21** and **R30** so that the carrier becomes minimum and comes to the center of the vectorscope. (Figure 39-2) 2. Remove the colour temperature transformer filter and align by **R21** and **R33** so that the carrier becomes minimum and comes to the center of the vectorscope. (Figure 39-2)  **Fig. 39-2**

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
40	6dB/12dB GAIN adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-D1 [PROCESS Module]	R15(6dB GAIN) R17 (12dB GAIN) [CONTROL Module]	• Confirm that the **WHITE BALANCE** switch is ☼. 1. Connect the oscilloscope to **TP-D1** and adjust the iris knob so that the waveform becomes **100mV**. 2. Switch the **GAIN** switch to **6dB** and adjust with **R15(6dB GAIN)** so that **200mV** is attained. (Figure 40-1) 3. Switch the **GAIN** switch over to **12dB** and adjust with **R17(12dB GAIN)** so that **400mV** is attained.  **Fig. 40-1**
41	AGC SET adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board]	R04(AGC SET) [CDS Module]	• Set the **TP-92(VIDEO OUT)** to **469mV** with the iris knob. • Switch the **AGC** switch over to **AUTO**. 1. Adjust with **R04(AGC SET)** so that **490mV** is attained.(Figure 41-1)  **Fig. 41-1**
42	IRIS SET adjustment	DC voltmeter Gray scale pattern	TP-92 (VIDEO OUT) [L] Connector ④pin [TERMINAL board]	R90(IRIS SET) [MATRIX Board]	• Set the **TP-92(VIDEO OUT)** to **700mV** with the iris knob. 1. Adjust with **R90(IRIS SET)** so that **L connector ④pin (AF lens terminal ④pin)** voltage becomes **1.87V**.
43	H. PHASE adjustment	Oscilloscope (H-rate 10:1)	TP-92 (VIDEO OUT) SYNC IN terminal [TERMINAL Board]	R13(H PHASE) R12 (H PHASE SUB) [TERMINAL Board]	• Input the VBS signal included in the SYNC IN terminal and apply external synchronization. 1. Rotate **R13(H PHASE)** to the mechanical center. 2. Connect CH1 of the oscilloscope to **TP-92 (VIDEO OUT)** and connect CH2 of the oscilloscope to the SYNC IN terminal. 3. Align the external synchronous signal and the camera side horizontal phase by **R12(H PHASE SUB)**.

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
44	FLANGE-BACK adjustment	Monitor TV Zoom lens Resolution pattern , object with clearly defined black and white lines or Siemens chart.	TP-92 (VIDEO OUT) [TERMINAL Board]	LOCK screw FOCUS screw	※ This adjustment can be made without removing the cover. • Fully open the iris in a dark location. 1. Place the resolution pattern in a location that is more then 5 meters away. (Place the pattern as far away as possible.) 2. Adjust the focus to the chart with TELE terminal. Next, confirm that the focusing is normal while gently focusing to WIDE status. 3. If the focus is not aligned, loosen the **LOCK screw**, adjust the **FOCUS screw** and align the focus. 4. Repeat steps 2 and 3 until the optimum focus is reached. 5. Tighten the **LOCK screw** at the point where the best back focus is attained.
45	FINAL CHECK	Oscilloscope (H-rate 10:1) Vectorscope Gray scale pattern Color bar pattern colored object	TP-92 (VIDEO OUT) [TERMINAL Board]		1. Take a picture of the colour bar in the standard iris mode or the auto iris mode (= lens with the auto iris function) and confirm that the various color carriers on the vectorscope are in the position indicated in figure 2. Operate the various switches and confirm that the action is normal. 3. roject the gray scale pattern and check the **WHITE BALANCE, CARRIER BALANCE** and **Y SET UP** etc. with **TP-92 (VIDEO OUT)**. 4. Take a picture of a suitable coloured object and check the color repeatability and the camera functions. 5. If the check results are unsatisfactory, carry out the various item checks once more.  **Fig. 45-1**

3. RGB CIRCUIT ADJUSTMENTS

Perform this adjustment after adjusting SSG (Synchronous signal generator) and the signal system.

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
1	COLOUR DIFFERENCE SIGNAL adjustment	Oscilloscope (H-rate 10:1) Colour bar pattern	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J1 TP-J2 [RGB DRIVE Module] TP-28 TP-29 [MATRIX Board]	R10(R-Y MTX) R62(B-Y MTX) [RGB DRIVE Module]	• Set TP-92 to 700mV with the iris knob. 1. Connect CH1 of the oscilloscope to TP-J1 and connect CH2 of the oscilloscope to TP-28. 2. Align with R10(R-Y MTX) the R-Y opposing waveform levels (A:B) of CH1 to the waveform of CH2. (Figure 1-1)  Fig. 1-1 3. Connect CH1 of the oscilloscope to TP-J2 and connect CH2 of the oscilloscope to TP-29. 4. Align with R62(B-Y MTX) the B-Y opposing waveform levels (A:B) of CH1 to the wave form of CH2. (Figure 1-2)  Fig. 1-2

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
2	RGB OUT adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J3(R OUT) TP-J5(B OUT) TP-J4(G OUT) [RGB DRIVE Module]	R30(RGB CLIP) R15(R GAIN) R26(R SET UP) R68(B GAIN) R82(B SET UP) R40(G GAIN) R51(G SET UP) R77(G SYNC) [RGB DRIVE Module]	• Set TP-92 to **700mV** with the iris knob. • Adjust with **R30(RGB CLIP)** so that the waveform amplitude becomes maximum. • Confirm that **D-SUB OUT** switch is set at **RGB**. 1. Connect the oscilloscope to **TP-J3** and adjust with **R15(R GAIN)** so that **630mV** is attained from black to white. (Figure 2-1) 2. Install the lens cap and adjust with **R26(R SET UP)** so that the set up level for the blanking section becomes **20mV**.(Figure 2-2) 3. Remove the lens cap and confirm that **700mV** is attained from the blanking to the white peak. (Figure 2-3) [If 700mV is not attained, adjust by **R15** to attain 700mV and confirm the set up level once more.] ※ Perform the adjustments for B and G in the same manner. B output→ Adjust **TP-J5** with **R68(B GAIN)** and **R82(B SET UP)**. G output→ Adjust **TP-J4** with **R40(G GAIN)** and **R51(G SET UP)**. [When adjusting the G output, rotate **R77(G SYNC)** completely to the left] **Note** :Perform adjustment so that the various RGB outputs attain the same gain.
3	RGB APERTURE CONTROL adjustment	Oscilloscope (H-rate 10:1) Gray scale pattern	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J4 [RGB DRIVE Module]	R30(RGB CLIP) R77(G SYNC) [RGB DRIVE Module] R10(RGB AP.L) [SUB RGB Module]	• Set TP-92 to **571mV(80IRE)** with the iris knob. • Adjust with **R30(RGB CLIP)** so that the waveform amplitude becomes maximum. • Rotate **R77(G SYNC)** completely to the left. 1. Connect the oscilloscope to **TP-J4** and adjust with **R10(RGB AP.L)** so that the gray scale mid-section white peak becomes **70mV**. (Figure 3-1)

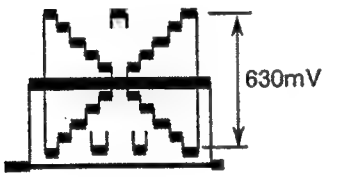


Fig. 2-1

Fig. 2-2

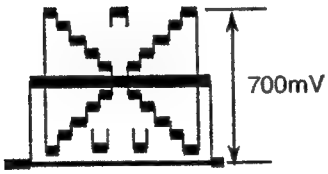


Fig. 2-3

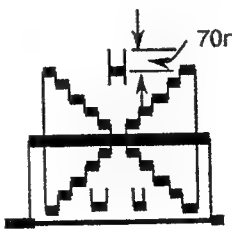
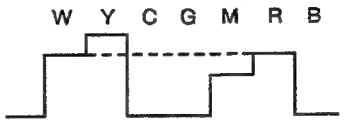
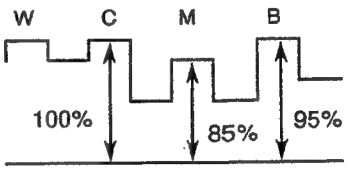
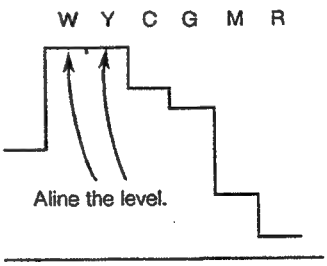
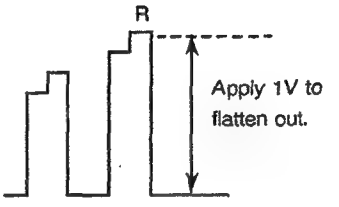


Fig. 3-1

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
4	RGB COLOUR REPEATABILITY adjustment	Oscilloscope (H-rate 10:1) Colour bar pattern	TP-92 (VIDEO OUT) [TERMINAL Board] TP-J3(R OUT) TP-J5(B OUT) TP-J4(G OUT) [RGB DRIVE Module]	R30(RGB CLIP) [RGB DRIVE Module] R10(R-Y MTX) R09(R-Y GAIN) R63(B-Y MTX) R62(B-Y GAIN) R35(G-Y MTX) [RGB DRIVE Module]	• Set TP-92 to 700mV with the iris knob. • Adjust with R30(RGB CLIP) so that the waveform amplitude becomes maximum. 1. Connect the oscilloscope to TP-J3 and align the red level with the white with R10(R-Y MTX) and R09(R-Y GAIN). (Figure 4-1)  Align the level. Fig. 4-1 2. Connect the oscilloscope to TP-J5 and adjust with R63(B-Y MTX) and R62(B-Y GAIN) so that the magenta level becomes approximately 85% white and blue level becomes approximately 95% . (Figure 4-2)  Fig. 4-2 3. Connect the oscilloscope to TP-J4 and adjust with R35(G-Y MTX) so that the yellow level becomes same level white.  Fig. 4-3

No.	Item	Measuring instrument & pattern	Test point	Adjustment part	Description
5	RGB CLIP adjustment	Oscilloscope (H-rate 10:1) Colour bar pattern	TP-J3 [RGB DRIVE Module]	R30(RGB CLIP) [RGB DRIVE Module]	• Fully open the iris. 1. Connect the oscilloscope to the **TP-J3** and adjust with **R30(RGB CLIP)** so that red is apply 1V to flatten out.  **Fig. 5-1**
6	Confirmation	RGB monitor			• Confirm with following procedure if a RGB monitor is available. 1. Compare the RGB output with the image output and confirm that the hue is equal. 2. If there is an extreme difference in the hue, adjust the RGB circuit once more.

PARTS LIST

CAUTION

- The parts marked ⚠ are very important for the safety. When replacing these parts, be sure to use specified ones to secure the safety and performance.
- The module circuit board is supplied together with the assembly, but the parts which do not have the drawing in this Parts List, P. C. Board Ass'y and the Parts No. columns of which are filled with lines —— . will not be supplied.
- As a rule, the resistors and capacitors which are indicated as shown in (NOTE 2) "HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS" are not shown in the list of the parts on the board.
  When ordering the service parts, confirm the resistance/rated power, capacitance/rated voltage, and type of the parts, then order by the part No. indicated according to (NOTE 2).

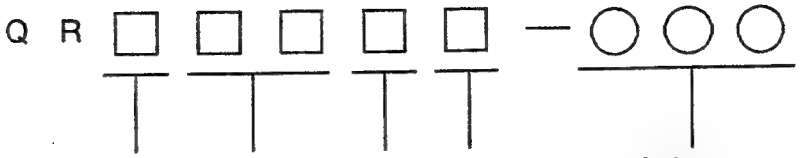
(NOTE 1) ABBREVIATIONS OF RESISTORS, CAPACITORS AND TOLERANCES

RESISTORS		CAPACITORS	
C R	Carbon Resistor	C CAP.	Ceramic Capacitor
F R	Fusible Resistor	E CAP.	Electrolytic Capacitor
P R	Plate Resistor	M CAP.	Mylar Capacitor
V R	Variable Resistor	HV CAP.	High Voltage Capacitor
HV R	High Voltage Resistor	MF CAP.	Metalized Film Capacitor
MF R	Metal Film Resistor	MM CAP.	Metalized Mylar Capacitor
MG R	Metal Glazed Resistor	MP CAP.	Metalized Polystyrol Capacitor
MP R	Metal Plate Resistor	PP CAP.	Polypropylene Capacitor
OM R	Metal Oxide Film Resistor	PS CAP.	Polystyrol Capacitor
CMF R	Coating Metal Film Resistor	TF CAP.	Thin Film Capacitor
UNF R	Non-Flammable Resistor	MPP CAP.	Metalized Polypropylene Capacitor
CH V R	Chip Variable Resistor	TAN. CAP.	Tantalum Capacitor
CH MG R	Chip Metal Glazed Resistor	CH C CAP.	Chip Ceramic Capacitor
COMP. R	Composition Resistor	BP E CAP.	Bi-Polar Electrolytic Capacitor
LPTC R	Linear Positive Temperature Coefficient Resistor	CH AL E CAP.	Chip Aluminum Electrolytic Capacitor
		CH AL BP CAP.	Chip Aluminum Bi-Polar Capacitor
		CH TAN. E CAP.	Chip Tantalum Electrolytic Capacitor
		CH AL BP E CAP.	Chip Tantalum Bi-Polar Electrolytic Capacitor

TOLERANCES									
F	G	J	K	M	N	R	H	Z	P
±1%	±2%	±5%	±10%	±20%	±30%	+30% - 10%	+50% - 10%	+80% - 20%	+100% - 0%

(NOTE 2) HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS

■ RESISTOR



Symbol	Part Name
C	COMP.R
D	C R
S	CH MG R

Symbol	Rated Power
0 1	1 w
1 2	1/2 w
1 4	1/4 w
1 6	1/6 w
1 8	1/8 w

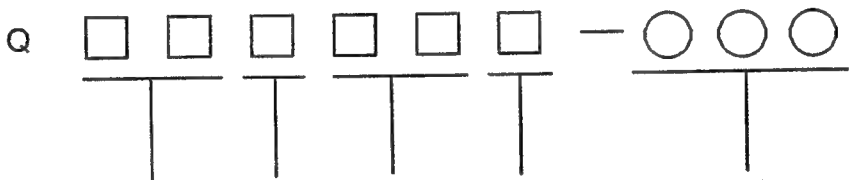
Symbol	Shape
1	Straight lead
8	Chip

Indicate with first two-figure expressed by Ω and following 0.
please note that,in case of resistance less than 10 Ω, a letter "R"will be effective as point.

EX.

2.2 Ω	=		2R2
470 Ω	=	47×10^{1} →	471
150kΩ	=	15×10^{4} →	154

■ CAPACITOR



Symbol	Part Name
CS	C CAP.
CS	CH C CAP.
ET	E CAP.
FM	M CAP.

5Figure / 6Figure	0	1	2
A		10V	100V
C		16V	160V
D			200V
E		25V	250V
H		50V	500V
J	6.3V	63V	
V		35V	

Indicate with first two-figure expressed by pF and following 0.
Please note that,in case of capacitance less than 10 pF a letter "R" will be effective as point.

EX

5pF	=		5R0
1000pF	=	10×10^{2} →	102
47μF	=	47×10^{6} →	476

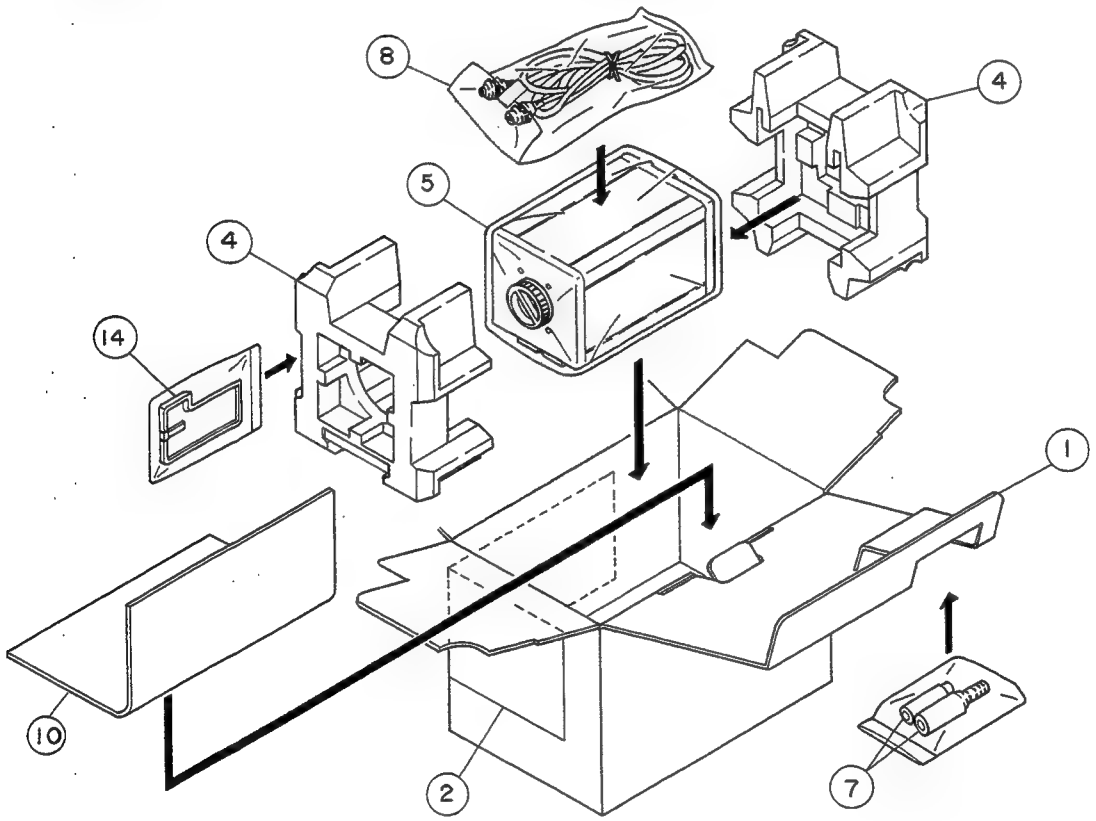
Symbol	Shape
1	Straight lead
1	Leads in the same direction
8	Chip
A	Leads in the same direction (compact part)

EXPLODED VIEW PARTS LIST

SYMBOL NO.	PART NO.	PART NAME	REMARKS
⚠ 1	————	MOTHER BOARD	CAT-1501A
⚠ 2	————	MATRIX BOARD	CAT-2001A
⚠ 3	————	TERMINAL BOARD	CAT-9501A
⚠ 4	CAT-A001A	IMAGER MODULE BO	ARD
⚠ 5	CAT-B501A	TG MODULE BOARD	
⚠ 6	CAT-C501A	SSG MODULE BOARD	
⚠ 7	CAT-D001B	PROCESS MODULE B	OARD
⚠ 8	CAT-E501A	ENCODER MODULE B	OARD
⚠ 9	CAT-F001B	CDC&AW MODULE BO	ARD
⚠ 10	CAT-G501A	GEN LOCK MODULE	BOARD
⚠ 11	CAT-H501A	CONTROL MODULE B	OARD
⚠ 12	CAT-J001B	RGB MODULE BOARD	
⚠ 13	CAT-K001B	RGB SUB MODULE B	OARD
⚠ 14	CAT-L001A	PULSE MIXER MODU	LE BOARD
16	CM34695-001	SHIELD CASE	
17	CM46890-001	INSULATOR	×2
18	CM44807-010	MODULE INSULATOR	
19	CM46781-001	MODULE INSULATOR	
20	CM46780-001	MODULE INSULATOR	
21	CM45867-001	DUST COVER	
22	CM22072-B01	FRONT COVER	
23	SPSK2040R	MINI SCREW	×4
24	SPSK2040M	MINI SCREW	×2
25	CM34691-001	LPF HOLDER	
26	CE41848-00A	L. P. FILTER ASSY	
27	SPSK2040R	MINI SCREW	×2
28	CM21346-003	CHASSIS MOUNT	
29	CM44319-A01	SEPARATOR	
30	CM46726-001	ECCENTRIC ROD	
31	LPSP2605Z	ASSY SCREW	
32	CM44651-002	LOCK PLATE	
33	CM46725-001	LOCK SCREW	
34	CM44652-001	PUSH BAR	
35	CM44653-001	LOCKING ARM	×2
36	CM44649-001	ADJUST SPRING	
37	CM34689-A01	ADJUST RING	
38	SPSK2040R	MINI SCREW	×3
39	CM34692-001	FRONT BRACKET	
40	CM43691-001	INSU. RUBBER	
41	ICX024BR-6	CCD IMAGER	
42	SPSH2060M	MINI SCREW	×2
43	CM34690-A01	IMAGER HOLDER	
44	SPSH2060M	MINI SCREW	×2
45	CM34697-001	IM SHIELD-R	
46	SPSK2040R	MINI SCREW	
47	CM22202-001	TOP FRAME	
48	SPSK2040R	MINI SCREW	×10
49	A75774-020-015	SUMI TUBE	
50	CM22070-001	BOTTOM FRAME	
51	CM46729-001	SLIDE KNOB	×3
54	CM22071-A01	TERMINAL BRACKET	
55	CH40326-009SN	9P CONN. SOCKET	
56	CH40327-A05	RETAINER	×2
57	WLS3000N	LOCK WASHER	×2
58	NNS3000N	NUT	×2
59	CEMB004-00A	BNC CONNECTOR	×2
60	QMD3A06-001	DIN SOCKET	
61	SPSK2040R	MINI SCREW	×2
62	QMDB108-001	MINI CONNECTOR	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
65	CM34762-00C	SIDE COVER ASSY	
66	SPSK2080R	MINI SCREW	×2
68	CM22074-003	ALMINIUM CASE	
69	CM22073-B01-M0	REAR COVER	
70	SPSK2040R	MINI SCREW	×2
⚠ 71	CM34694-006 (R)	R RATING LABEL	
72	SPSK2040R	MINI SCREW	×2
73	CM21394-C0A-M0	TRIPOD BASE ASS	
74	CM32754-C01-M0	TRIPOD COVER	
75	CM46969-00A	ASSY SCREW	×3
76	CM46981-A01	HEAT SINK-S	
77	SPSH2023M	MINI SCREW	
78	CM47239-001	EARTH SPRING	

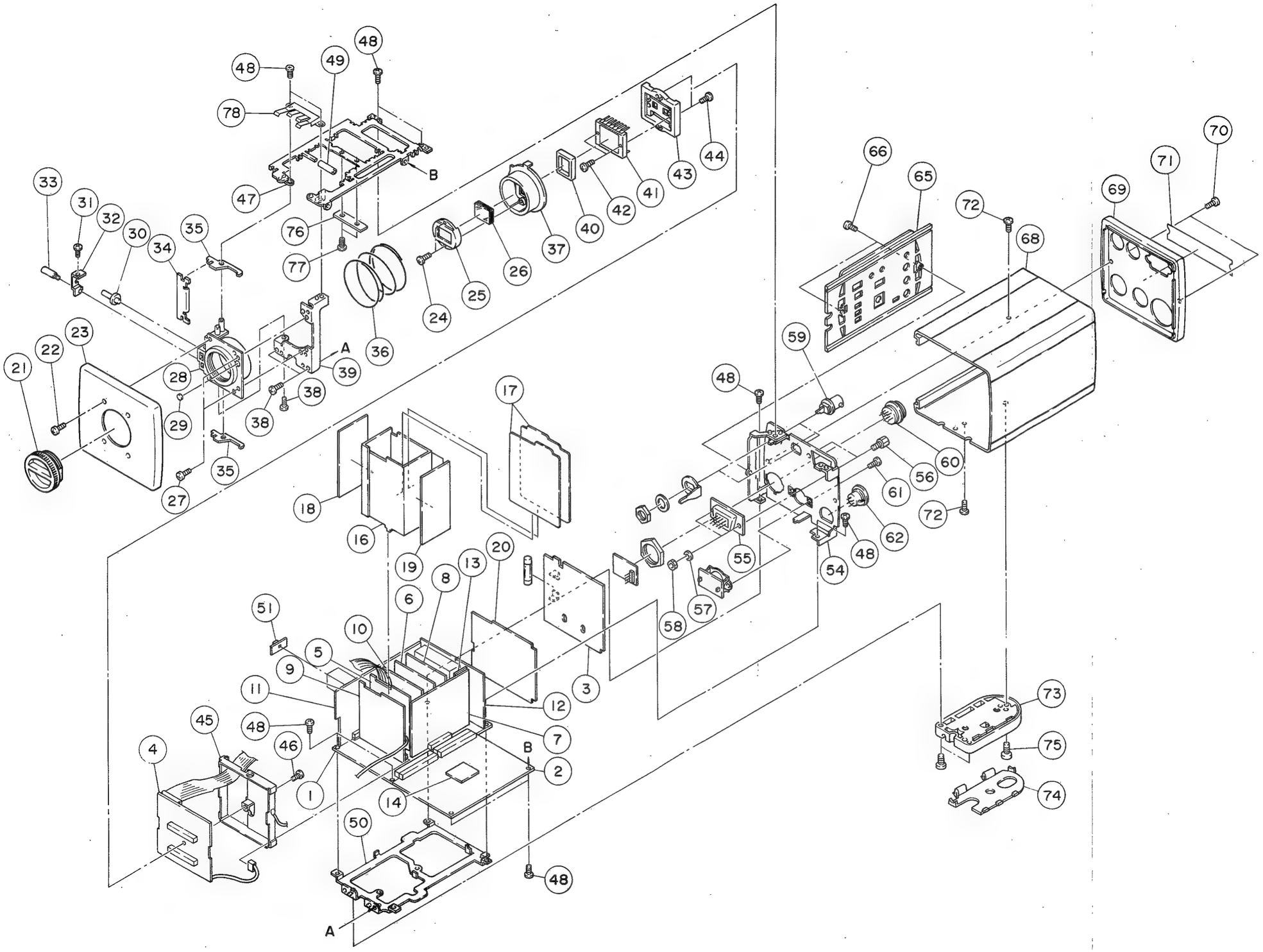
PACKING



PACKING PARTS LIST

SYMBOL NO.	PART NO.	PART NAME	REMARKS
1	CP20513-007	PACKING CASE	
2	CP30609-002 (R)	ROLL LBL SHEET	
4	CP20539-A0A	PACKING CUSHION	
5	CP30367-009	POLY BAG	
7	CE41155-001	IRIS PLUG	
8	VC462-2	CAMERA CABLE	2m
⚠ 10	TK-1070E-IB-A	INST BOOK	
14	CM22184-B0A	CONT COVER ASSY	

EXPLODED VIEW



(No.50564) 47

(No.50564) 48

PRINTED CIRCUIT BOARD PARTS LIST

1.MOTHER BOARD (CAT-1501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
C1002	NEE10JM-106RZ	CHIP TAN E CAP.	10μF 6.3V M
C1003	NEE11VM-474RZ	CHIP TAN E CAP.	0.47μF 35V M
C1004	NEE11CM-106RZ	CHIP TAN E CAP.	10μF 16V M
C1005	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C1006	QEHA1VM-337M	E CAP.	330μF 35V M
C1007	QEHA1CM-227M	E CAP.	220μF 16V M
C1008	NEE11CM-226RZ	CHIP TAN E CAP.	22μF 16V M
C1009	NEE11CM-226RZ	CHIP TAN E CAP.	22μF 16V M
COIL			
L1001	CELP015-820	P COIL	
TRANSISTOR			
Q1001	2SB709 (QR) -W	CHIP TRANSISTOR	
Q1003	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q1004	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q1005	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q1006	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q1007	2SD1742 (P) -X	CHIP TRANSISTOR	
Q1008	2SB709 (QR) -W	CHIP TRANSISTOR	
Q1009	2SC2778 (BC) -W	CHIP TRANSISTOR	
OTHERS			
	CM46772-001	INSULATOR A	
⚠ RG1001	CE41896-C0A	SW REGULATOR	

2.TERMINAL BOARD (CAT-9501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
RESISTOR			
R9021	QRD122J-100S	C R	10Ω 1/2W J
CAPACITOR			
C9005	NEE11CM-106RZ	CHIP TAN E CAP.	10μF 16V M
C9010	NEN11EM-106RP	CHIP AL BP E CAP	10μF 25V M
C9011	NEN11EM-106RP	CHIP AL BP E CAP	10μF 25V M
C9012	QCT81CH-221YLS	CHIP C CAP.	220pF 16V H
DIODE			
D9001	MA157-W	DIODE	
D9002	MA157-W	DIODE	
D9003	MA157-W	DIODE	
D9004	MA157-W	DIODE	
D9005	MA3047 (L) -W	ZENER DIODE	
D9006	MA157-W	DIODE	
D9007	MA3200 (M) -W	ZENER DIODE	
D9009	MA291-W	CHIP DIODE	
D9010	MA157-W	DIODE	
D9011	MA157-W	DIODE	
D9012	MA157-W	DIODE	
D9013	MA157-W	DIODE	
D9014	MA3200 (M) -W	ZENER DIODE	
TRANSISTOR			
Q9001	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q9002	2SD1030 (RS) -W	CHIP TRANSISTOR	
Q9003	2SD601 (QR) -W	CHIP TRANSISTOR	
FUSE			
⚠ F9001	QMF51E2-1R0S	FUSE	1A
OTHERS			
S9002	QMD8A03-001	MINI CONNECTOR	

3.MATRIX BOARD(CAT-2001A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
R2035	CEVP005-103XM	CH V R	10kΩ G1 GAIN
R2036	CEVP005-103XM	CH V R	10kΩ R/B1 GAIN
R2037	CEVP005-103XM	CH V R	10kΩ G2 GAIN
R2038	CEVP005-103XM	CH V R	10kΩ R/B2 GAIN
R2039	CEVP005-103XM	CH V R	10kΩ MPX
R2042	CEVP005-103XM	CH V R	10kΩ R-Y GAIN
R2043	CEVP005-103XM	CH V R	10kΩ R-Y/B-YGAIN
R2044	CEVP005-103XM	CH V R	10kΩ B-Y GAIN
R2052	CEVP005-682XM	CH V R	6.8kΩ A/WB
R2053	CEVP005-682XM	CH V R	6.8kΩ A/WR
R2087	CEVP005-103XM	CH V R	10kΩ R-Y MIX
R2088	CEVP005-103XM	CH V R	10kΩ B-Y MIX
R2089	CEVP005-103XM	CH V R	10kΩ V. CONTOUR
R2090	CEVP005-223XM	CH V R	22kΩ IRIS SET
CAPACITOR			
C2001	NEA11CM-106RZ	CHIP AL E CAP.	10μF 16V M
C2003	NEA11CM-106RZ	CHIP AL E CAP.	10μF 16V M
C2005	NEA11CM-106RZ	CHIP AL E CAP.	10μF 16V M
C2007	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2020	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2022	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2023	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2024	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2025	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2026	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2028	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2029	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2030	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2031	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2036	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2038	NEA11CM-106RZ	CHIP AL E CAP.	10μF 16V M
C2041	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2043	NEE11CM-106RZ	CHIP TAN E CAP.	10μF 16V M
C2044	NEA11CM-106RZ	CHIP AL E CAP.	10μF 16V M
C2045	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2047	NEA10JM-226RZ	CHIP AL E CAP.	22μF 6.3V M
C2048	NEA10JM-226RZ	CHIP AL E CAP.	22μF 6.3V M
C2049	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
C2050	NEE21CM-105RY	CHIP TAN E CAP.	1μF 16V M
TRANSFORMER			
T2001	CE41120-00AY	REFLOW TRANSF.	
T2002	CE41120-00AY	REFLOW TRANSF.	
T2003	CE41917-00AY	REFLOW TRANSF.	
T2004	CE41918-00AY	REFLOW TRANSF.	
T2005	CE41920-00AY	REFLOW TRANSF.	
DIODE			
D2001	MA157-W	DIODE	
D2002	MA151A-W	DIODE	
TRANSISTOR			
Q2001	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2002	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2003	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2004	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2005	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2006	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2007	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2008	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2009	2SA1022 (BC) -W	CHIP TRANSISTOR	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
TRANSISTOR			
Q2010	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2011	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2012	2SA1022 (BC) -W	CHIP TRANSISTOR	
Q2013	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2014	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2015	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2016	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2017	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2018	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2019	2SB709 (QR) -W	CHIP TRANSISTOR	
Q2020	2SB709 (QR) -W	CHIP TRANSISTOR	
Q2021	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2022	2SB709 (QR) -W	CHIP TRANSISTOR	
Q2023	2SB709 (QR) -W	CHIP TRANSISTOR	
Q2024	2SC2295 (BC) -W	CHIP TRANSISTOR	
Q2025	2SC2295 (BC) -W	CHIP TRANSISTOR	
Q2026	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2028	2SC2778 (BC) -W	CHIP TRANSISTOR	
Q2029	2SB709 (QR) -W	CHIP TRANSISTOR	
IC			
IC2001	CX20151	I. C.	
IC2002	CXL1505M	I. C.	
IC2003	CXL1505M	I. C.	
IC2004	UPC358G-W	I. C.	
IC2005	UPC358G-W	I. C.	

MODULE BOARD PARTS LIST

1.IMAGER MODULE BOARD (CAT-A001A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RA015	CEVP003-333WA	CH V R	33kΩ V SUB

2.TG MODULE BOARD (CAT-B501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
CB024	QAT3661-100M	TRIM. CAPACITOR	10pF SUB OSC

3.SSG MODULE BOARD (CAT-C501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
CC007	QAT3661-200M	TRIM CAPACITOR	200pF MASTER OSC

4.PROCESS MODULE BOARD (CAT-D001B)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RD005	CEVP005-332XM	CH V R	3.3kΩ τ1 R/B PED
RD009	CEVP005-682XM	CH V R	6.8kΩ τ1 G CLIP
RD012	CEVP005-222XM	CH V R	2.2kΩ τ1 G GAIN
RD023	CEVP005-222XM	CH V R	2.2kΩ τ1 R/B GAIN
RD051	CEVP005-103XM	CH V R	10kΩ B GAIN
RD052	CEVP005-103XM	CH V R	10kΩ R GAIN
RD054	CEVP005-103XM	CH V R	10kΩ GAMMA
RD055	CEVP005-103XM	CH V R	10kΩ KNEE
RD056	CEVP005-103XM	CH V R	10kΩ G CONT
RD059	CEVP005-103XM	CH V R	10kΩ GAMMA2
RD062	CEVP005-223XM	CH V R	22kΩ PED
RD070	CEVP005-332XM	CH V R	3.3kΩ τ1 G PED
RD071	CEVP005-682XM	CH V R	6.8kΩ τ1 R/B CLIP
RD081	CEVP005-222XM	CH V R	2.2kΩ G CLIP
RD086	CEVP005-222XM	CH V R	2.2kΩ R/B CLIP

5.ENCODER MODULE BOARD (CAT-E501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RE003	CEVP003-474WA	CH V R	470kΩ DTL OFF APL
RE005	CEVP003-223WA	CH V R	22kΩ AP LEVEL
RE010	CEVP003-473WA	CH V R	47kΩ Y GAIN
RE012	CEVP003-473WA	CH V R	47kΩ WC
RE017	CEVP003-223WA	CH V R	22kΩ Y SET UP
RE020	CEVP003-473WA	CH V R	47kΩ SYNC LEVEL
RE030	CEVP003-223WA	CH V R	22kΩ BURST LEVEL
RE033	CEVP003-331WA	CH V R	330 Ω C LEVEL

6.CDS & AW MODULE BOARD (CAT-F001B)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RF004	CEVP003-102WA	CH V R	1kΩ AGC SET
RF012	CEVP003-332WA	CH V R	3.3kΩ 0dB GAIN
RF016	CEVP003-332WA	CH V R	3.3kΩ MAX GAIN
RF032	CEVP003-471WA	CH V R	470 Ω G MIX

7.GEN LOCK MODULE BOARD (CAT-G501A)

8.CONTROL MODULE BOARD (CAT-H501A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RH005	QVPB606-102K	V R	1kΩ SC FINE
RH012	CEVP005-103XM	CH V R	10kΩ SUB H PHASE
RH013	QVPB606-103K	V R	10kΩ H PHASE
RH015	CEVP005-103XM	CH V R	10kΩ 6dB GAIN
RH017	CEVP005-103XM	CH V R	10kΩ 12dB GAIN
RH021	QVPB606-103K	V R	10kΩ R-B
RH025	QVPB606-103K	V R	10kΩ G-Mg
RH030	CEVP005-332XM	CH V R	3.3kΩ MANU. R
RH033	CEVP005-223XM	CH V R	22kΩ MANU. R. GAIN
RH041	CEVP005-472XM	CH V R	4.7kΩ B CONT
RH043	CEVP005-472XM	CH V R	4.7kΩ R CONT
RH049	CEVP005-223XM	CH V R	22kΩ A/WB SUB
OTHERS			
SWH001	QSS1A12-C07	SLIDE SWITCH	SC COARCE
SWH002	QSS1A12-C07	SLIDE SWITCH	DETAIL
SWH003	QSS1A12-C07	SLIDE SWITCH	GAMMA
SWH004	QSS1A12-C07	SLIDE SWITCH	D SUB OUT
SWH005	QSS1A13-C05	SLIDE SWITCH	GAIN MODE
SWH006	QSS1A12-C07	SLIDE SWITCH	GAIN
SWH007	CESD007-001	DIP SWITCH	SHUTTER
SWH008	QSP1A11-C02	PUSH SWITCH	WB SET
SWH009	QSS1A13-C05	SLIDE SWITCH	WB MODE

9.RGB MODULE BOARD (CAT-J001B)

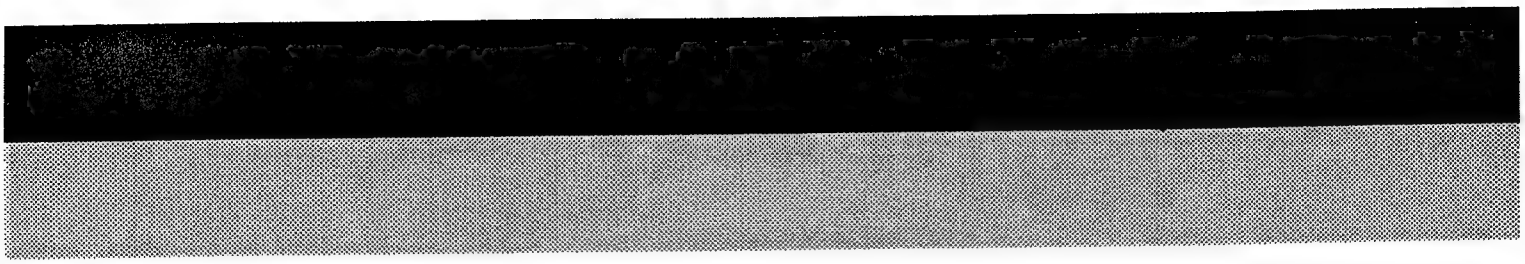
SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RJ009	CEVP003-222WA	CH V R	2.2kΩ R-Y GAIN
RJ010	CEVP003-103WA	CH V R	10kΩ R-Y MATRIX
RJ015	CEVP003-682WA	CH V R	6.8kΩ R GAIN
RJ026	CEVP003-103WA	CH V R	10kΩ R SET UP
RJ030	CEVP003-332WA	CH V R	3.3kΩ RGB CLIP
RJ035	CEVP003-222WA	CH V R	2.2kΩ G-Y MATRIX
RJ040	CEVP003-682WA	CH V R	6.8kΩ G GAIN
RJ051	CEVP003-103WA	CH V R	10kΩ G SET UP
RJ062	CEVP003-332WA	CH V R	3.3kΩ B-Y GAIN
RJ063	CEVP003-103WA	CH V R	10kΩ B-Y MATRIX
RJ068	CEVP003-682WA	CH V R	6.8kΩ G GAIN
RJ077	CEVP003-473WA	CH V R	47kΩ G SYNC
RJ082	CEVP003-103WA	CH V R	10kΩ B SET UP
RJ089	CEVP003-472WA	CH V R	4.7kΩ Y LEVEL

10.RGB SUB MODULE BOARD (CAT-K001B)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
RK010	CEVP003-472WA	CH V R	4.7kΩ RGB AP. L

11.PULSE MIXER MODULE BOARD (CAT-L001A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
RESISTOR			
RL006	CEVP005-223XM	CH V R	22kΩ R-Y DC
RL007	CEVP005-223XM	CH V R	22kΩ B-Y DC



JVC

VICTOR COMPANY OF JAPAN,LIMITED
IMAGING SYSTEMS DIVISION 1106 Iwai-city,Ibaraki-prefecture,306-06,Japan

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9105 OP
N.O / C.H / A.N

STANDARD CIRCUIT DIAGRAM

※Since the circuit diagram is a standard one,the circuit and circuit constants may be subject to change for improvement without any notice.

■ SAFETY

The compornents identified by the ⚠ symbol and shading are critical for safety. For continued safety replace safety critical components only with manufactures recomended parts.

■ Voltages and Waveforms

The voltages and waveforms are measured under the following conditions.

- **Illumination** :Illumination condition during adjustment
- **Object** :Gray scale pattern (GS-2A)
  Color bar pattern (CC-2T)
- **Iris** :Set the VIDEO OUT wave form level to 700mV$_{PD-WP}$ (AGC FIX) with IRIS switch (at the lens side)
- **Switch** : AGC = FIX(GAIN = 0dB)
  WHITE BALANCE = ×
  DETAIL = ON
  GAMMA = 0.45
  D-SUB OUT = RGB
  SHUTTER = NORM
  SC COARSE = 1
- **Voltages** :All DC voltage values.
- **Waveforms** :Use 10 : 1 probe

■ Parts symbol number indications [Example]

- **In the PC board:CAT-1501A**
  R1001→R1 or R01
  C1023→C23
- **Module PC board:CAT-A001A**
  ICA001→IC1
  QA023→Q23
- **Parts not actually used**
  Parts shown in parentheses ( ), e.g., (R45), are not actually used.
  (They are not mounted on the board.)
- **VR and switch functions**
  VR and switch functions are indicated by nearby rectangles. Where VRs etc. are grouped, the VR symbols are indicated above the rectangle.

■ Schematic indications

1. Resistors

- Resistance value
  non-unit :[Ω]
  K :[KΩ]
  M :[MΩ]
- Rated allowable power
  non-unit :1/10[W]
  others :As indicated
- Type
  non-indication :Carbon resistor or Chip resistor
  OMR :Oxide metal film resistor
  MFR :Metal film resistor
  FR :Fusible resistor

2. Capacitoris

- Capacitance value
  1or higher :[pF]
  less than 1 :[μF]
- Withstand voltage
  non-indication :DC50[V]
  others :DC withstand voltage[V]
  AC indication :AC withstand voltage[V]
- Electolytic Capacitors
  47/50 :Capacitance value[μF]/withstand voltage[V]
- Type
  non-indication :Ceramic capacitor
  MY :Mylar capacitor
  NP :Non-polar electolytic capacitor
  BP :Bipolar electolytic capacitor
  Ⓣ :Tantalum capacitor

3. Coils

non-unit :[μH]
others :As indicated

4. Power Supply

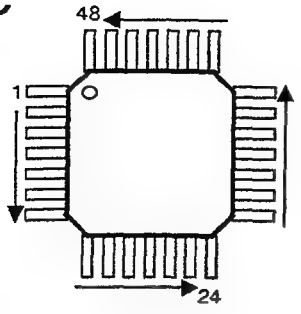
 :+12V
 :+8.5V
 :+7.7V
 :+5V

■ Color of P.C.Board. patten.

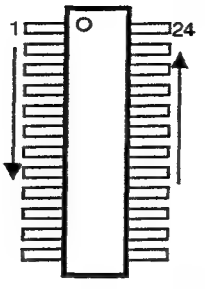
 :Top side
Blue :Bottomside

■ PIN ARRANGEMENTS OF ICs AND TRANSISTORS

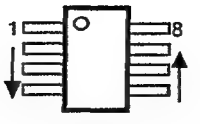
IC



CX20151

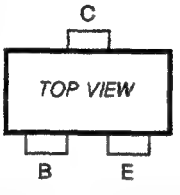


CXL1505M



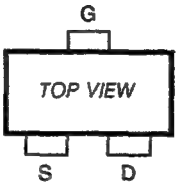
µPC358G

Transistor

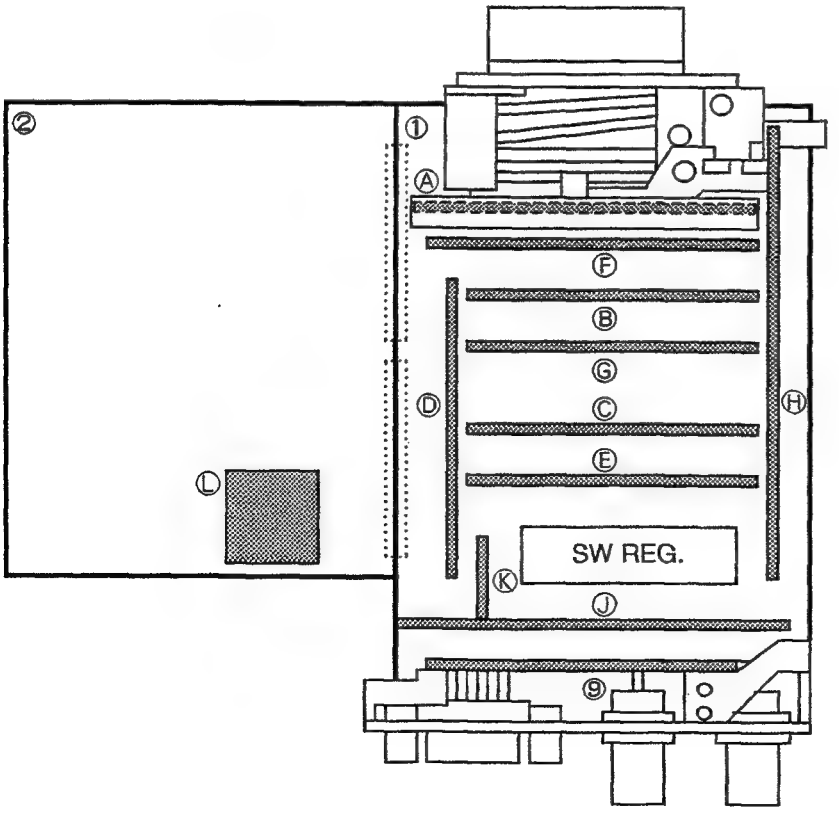


2SA1022(BC) 2SD1030(RS)
2SB709(QR) 2SD1742(P)
2SC2295(BC) 2SD601(QR)
2SC2778(BC)

FET

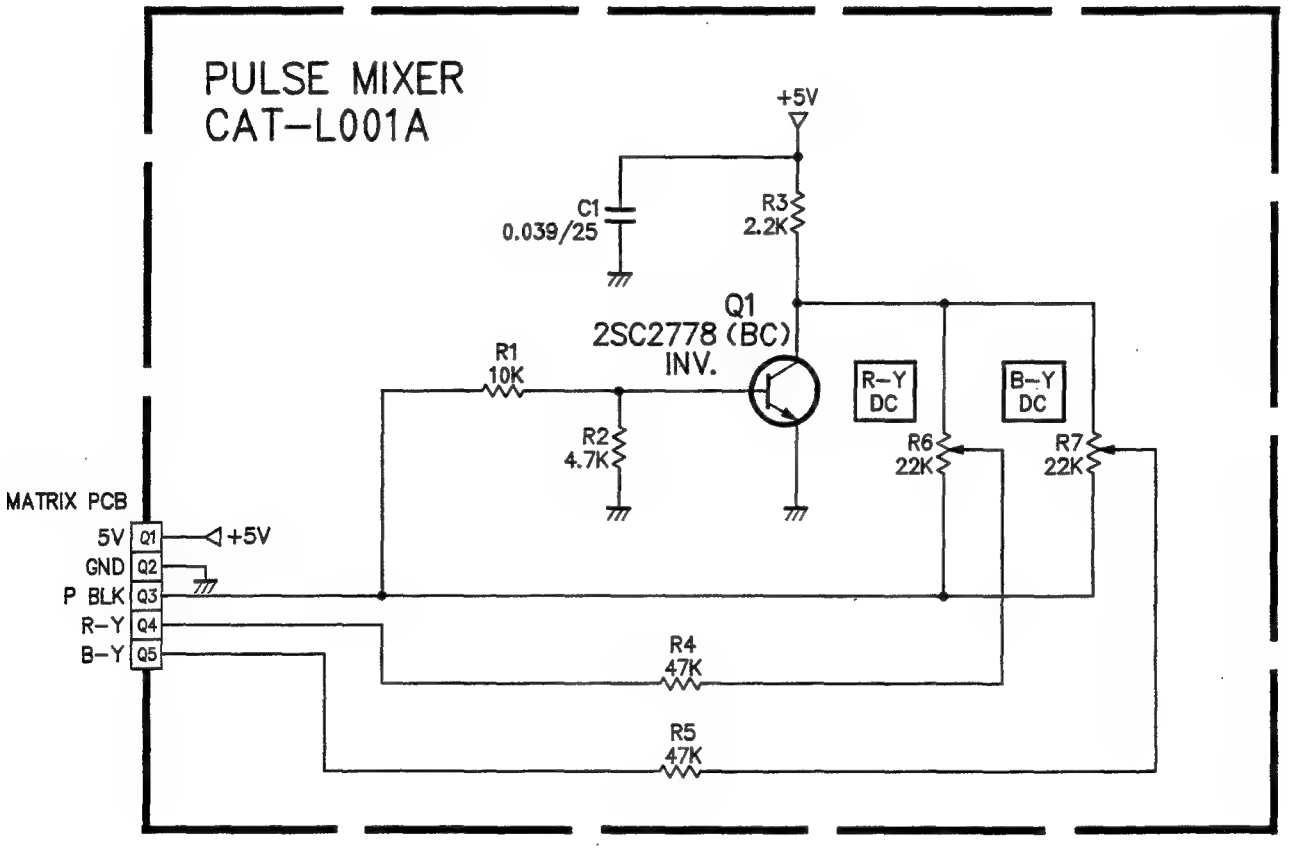


■ PCB LOCATION



	PCB No.	PCB NAME	CN No.
1	CAT-1501A	MOTHER	
2	CAT-2001A	MATRIX	D,E
9	CAT-9501A	TERMINAL	L,f,g
A	CAT-A001A	IMAGER	O,e
B	CAT-B501A	TG	F,G,P
C	CAT-C501A	SSG	I
D	CAT-D001B	PROCESS	C
E	CAT-E501A	ENCODER	J
F	CAT-F001B	CDS AW	A,B,T
G	CAT-G501A	GEN LOCK	H
H	CAT-H501A	CONTROL	M,N
J	CAT-J001B	RGB DRIVER	K,a,b
K	CAT-K001B	RGB-SUB	a,b
L	CAT-L001A	PULSE MIXER	Q

■ PULSE MIXER PCB(CAT-L001A)CIRCUIT DIAGRAM



JVC

SERVICE MANUAL

COLOR VIDEO CAMERA HEAD

TK-1070E

BASIC CHASSIS
V57

Supplement

It is notified that the TK-1070E has been altered in the circuitry of the MATRIX board of the products which were manufactured in October, 1991 and after.
Therefore, this supplement contains only the matters different from the original service manual of the TK-1070E (No. 50564) issued in May, 1991. For further details refer to the original.

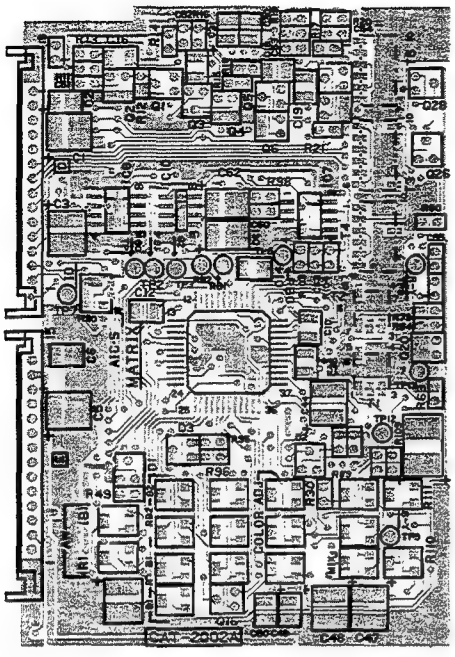
Altered Points

1. MATRIX board
   (1) The PULSE MIXER board is incorporated in the MATRIX board.
   (2) Non-adjusting MPX OFFSET (with addition of the Line Offset Compensator circuit)
   (3) Change of the board assembly to CAT-2002A in number (interchangeable with old assembly number CAT-2001A)
2. PULSE MIXER board
   (1) Deleted
3. GEN-LOCK board
   (1) Change of the board figure. 
   (2) Change of the board assembly to CAT-G502A in number

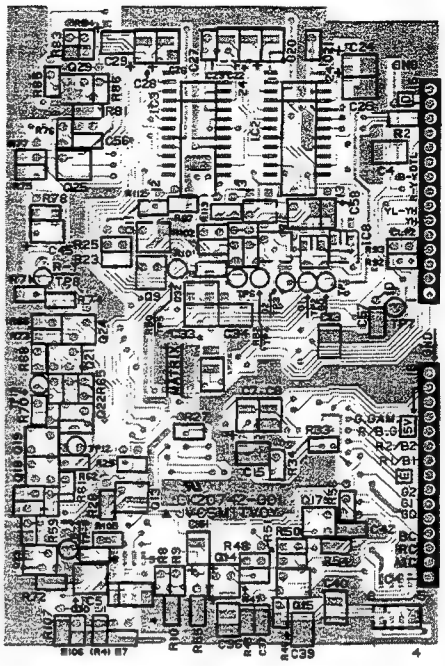
No. 50564B
July 1993

MATRIX CIRCUIT BOARD

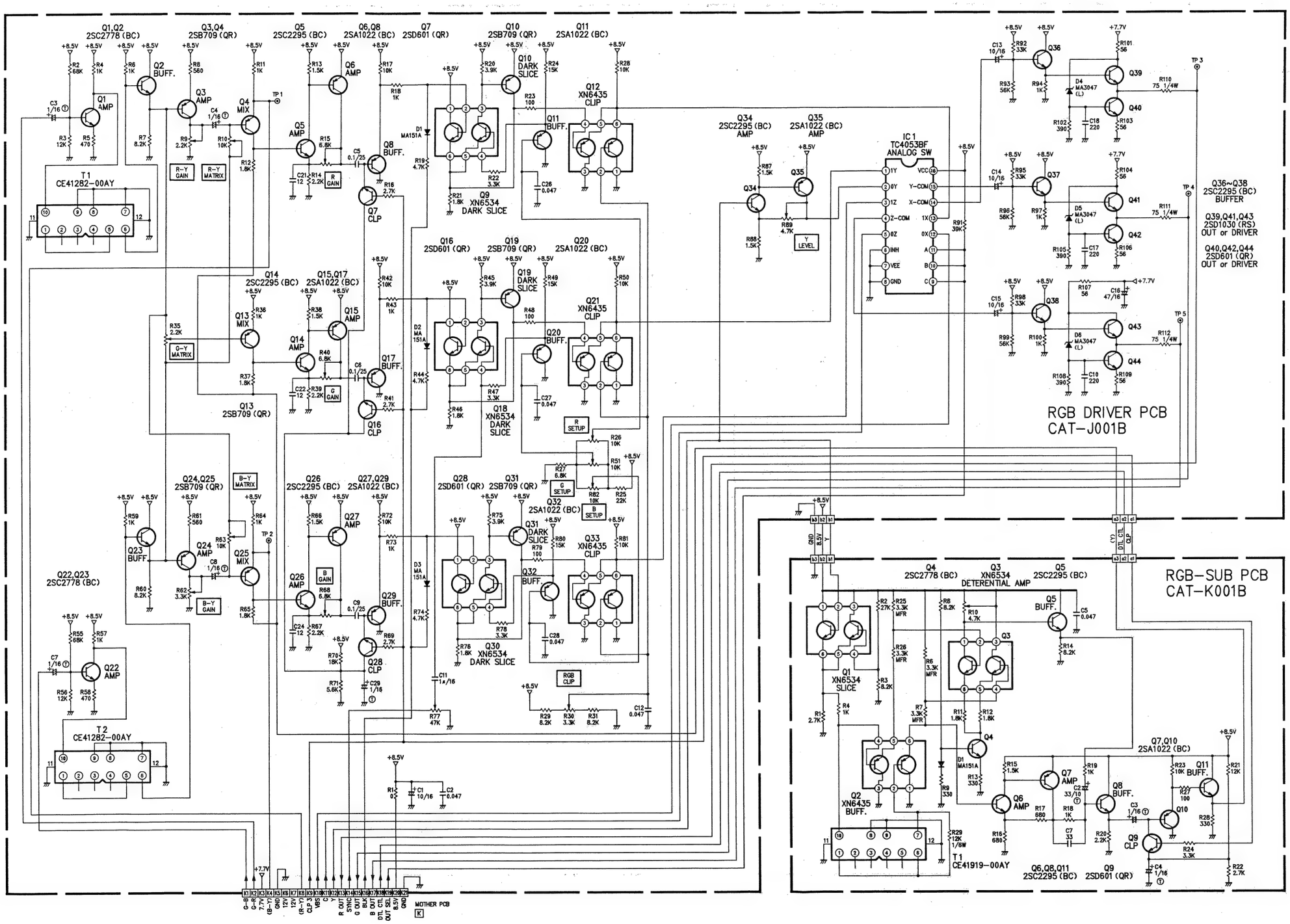
Side A



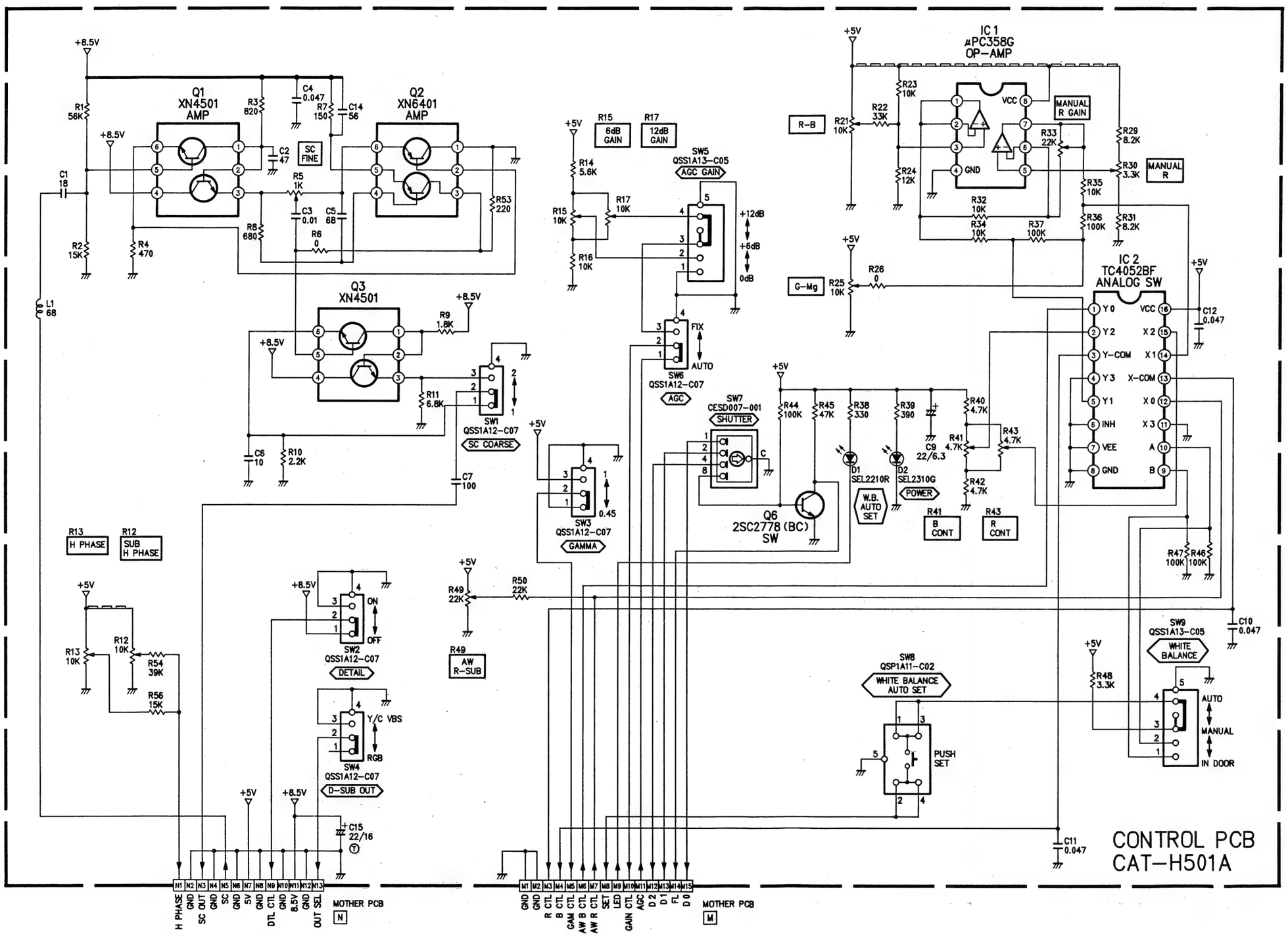
Side B



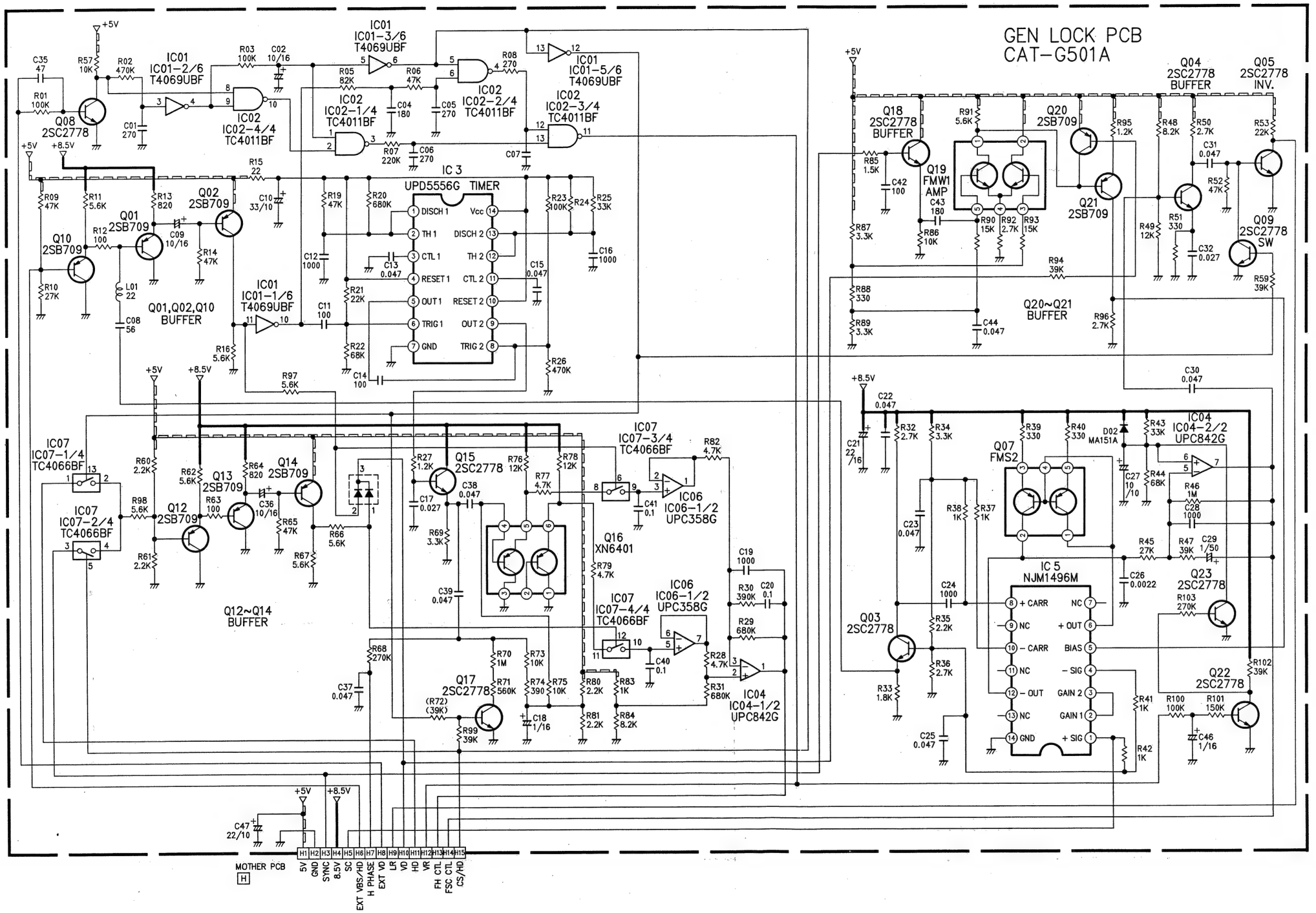
■ RGB DRIVER / RGB-SUB PCB (CAT-J001B/CAT-K001B) CIRCUIT DIAGRAM



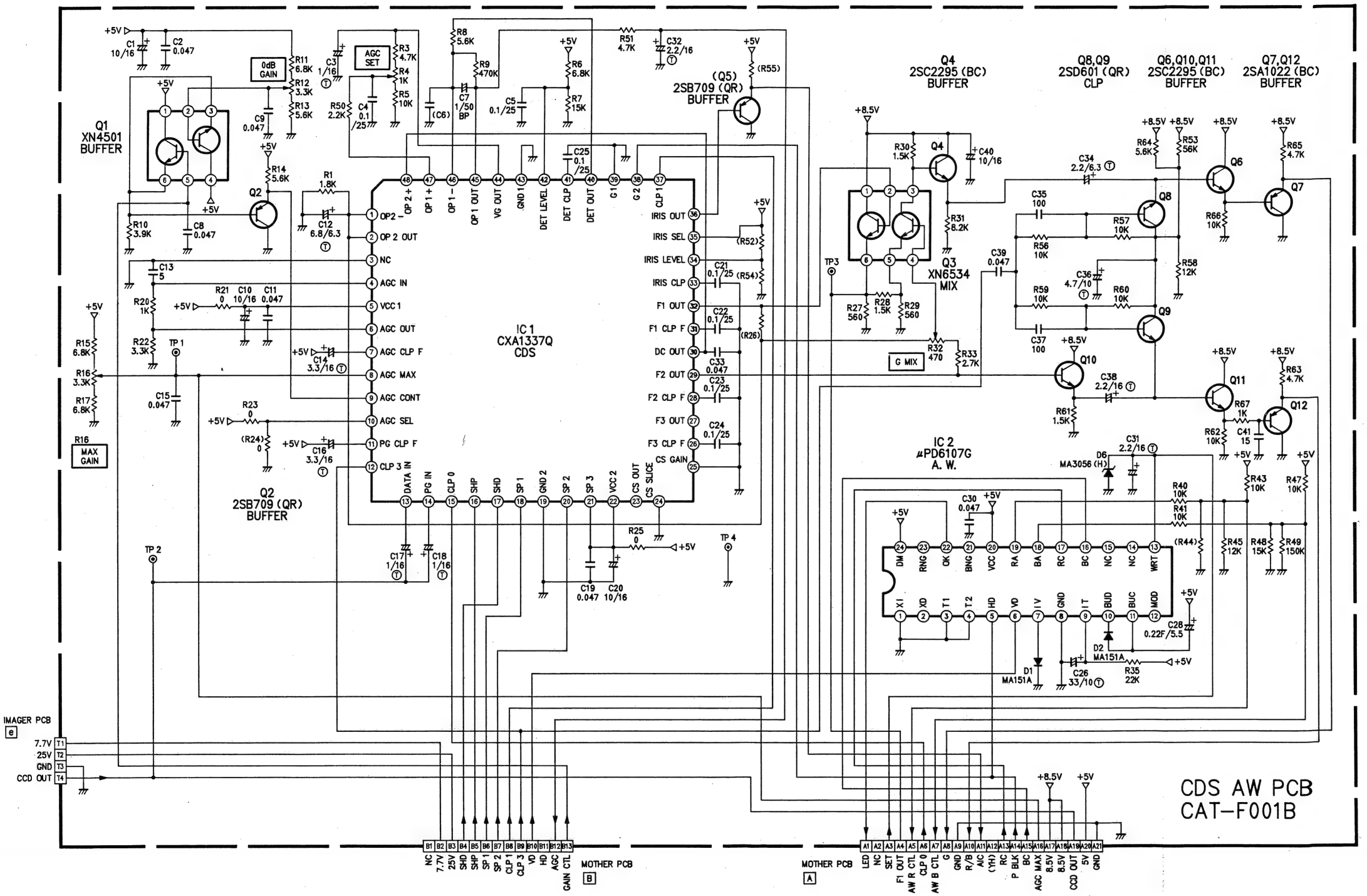
■ CONTROL PCB(CAT-H501A)CIRCUIT DIAGRAM



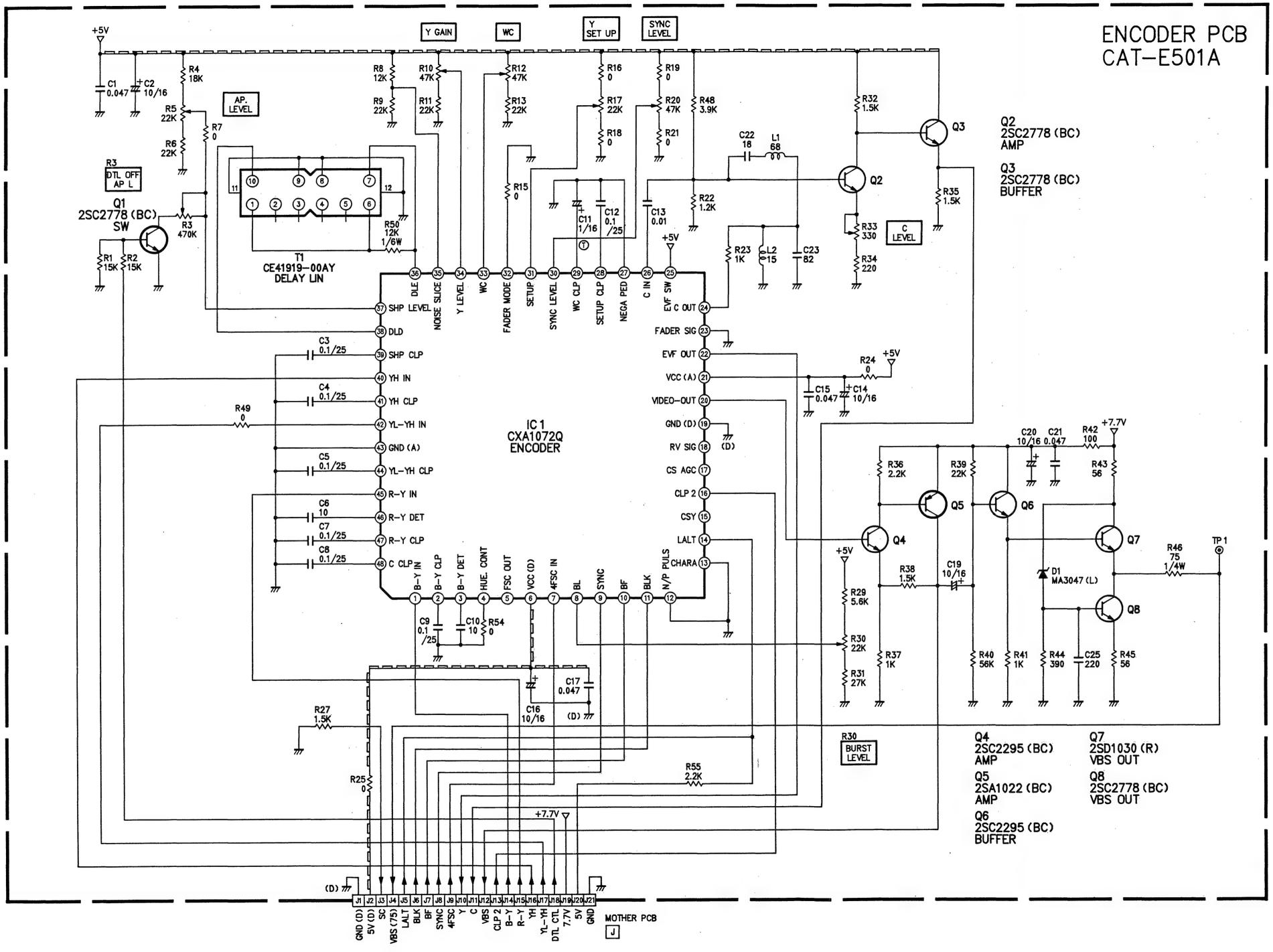
■ GEN LOCK PCB(CAT-G501A)CIRCUIT DIAGRAM



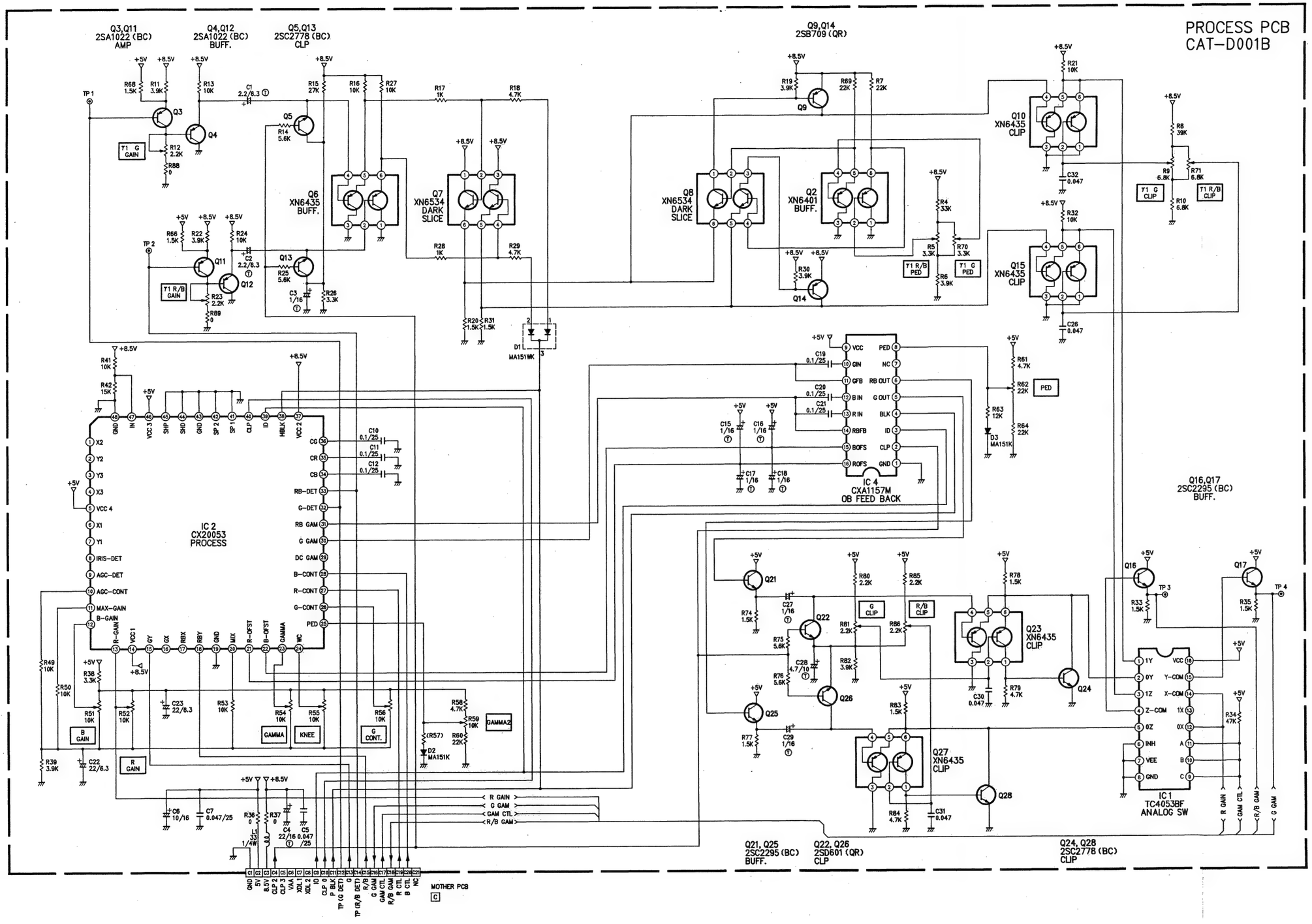
■CDS AW PCB(CAT-F001B)CIRCUIT DIAGRAM



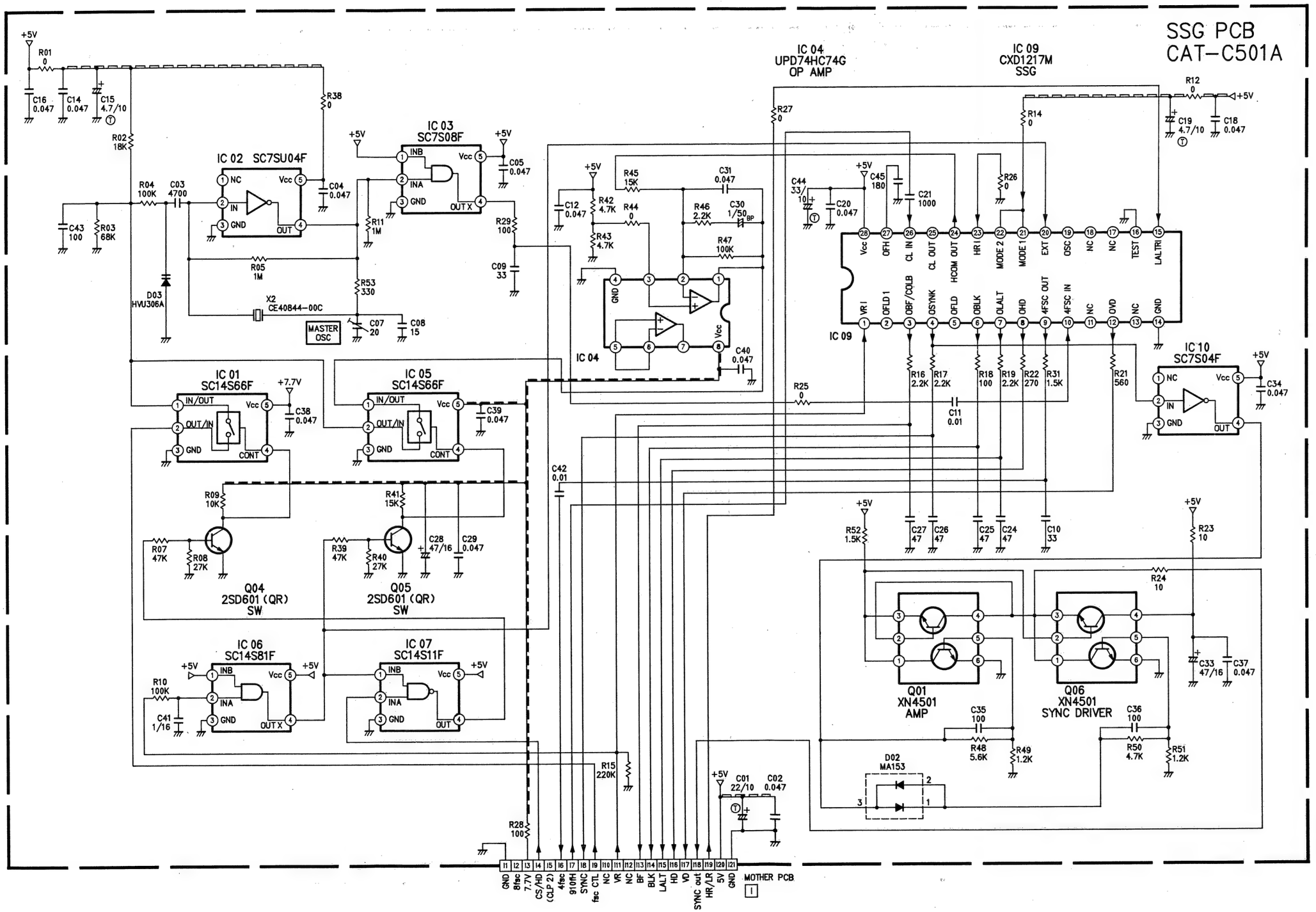
■ ENCODER PCB(CAT-E501A)CIRCUIT DIAGRAM



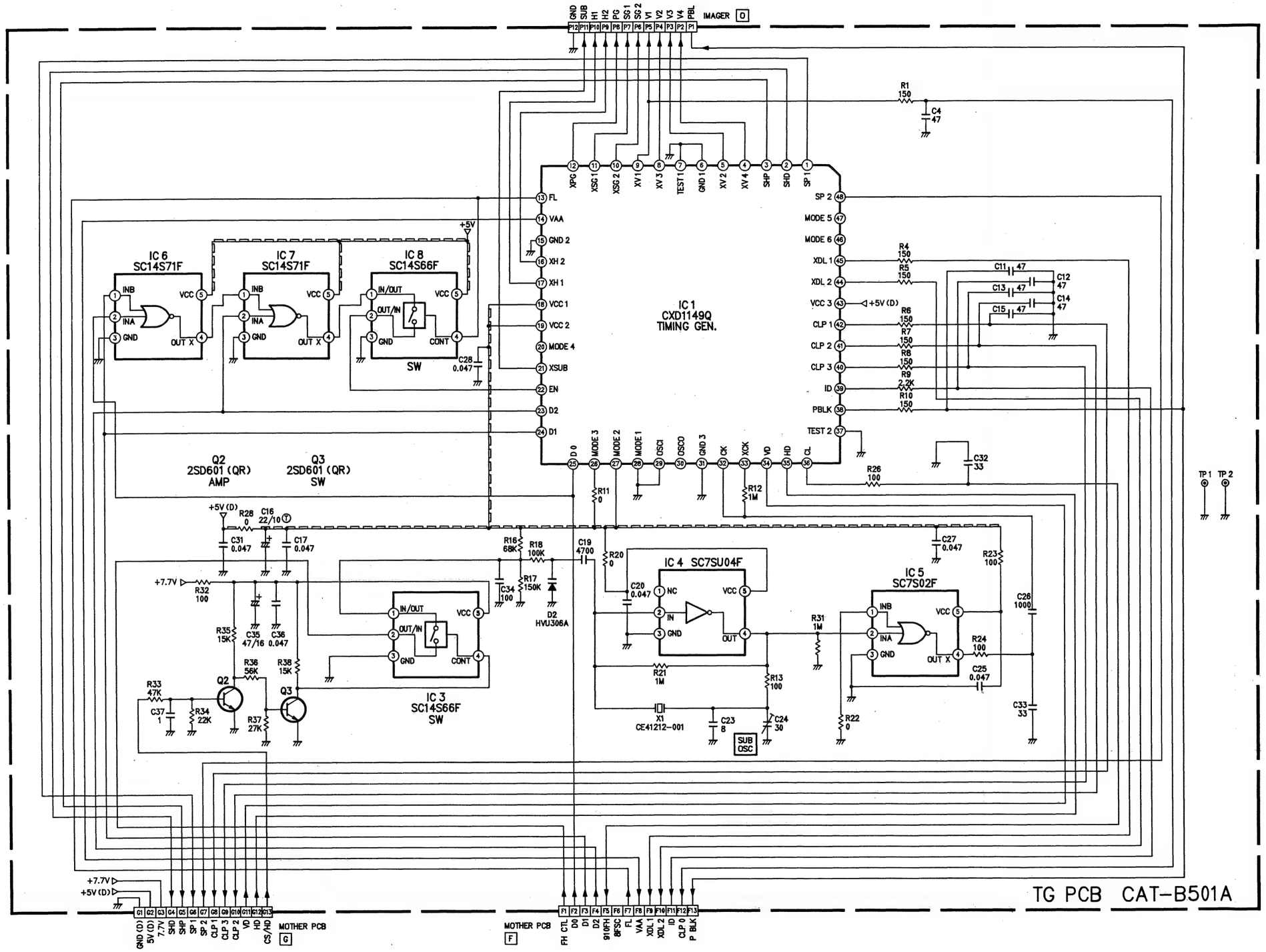
■ PROCESS PCB(CAT-D001B)CIRCUIT DIAGRAM



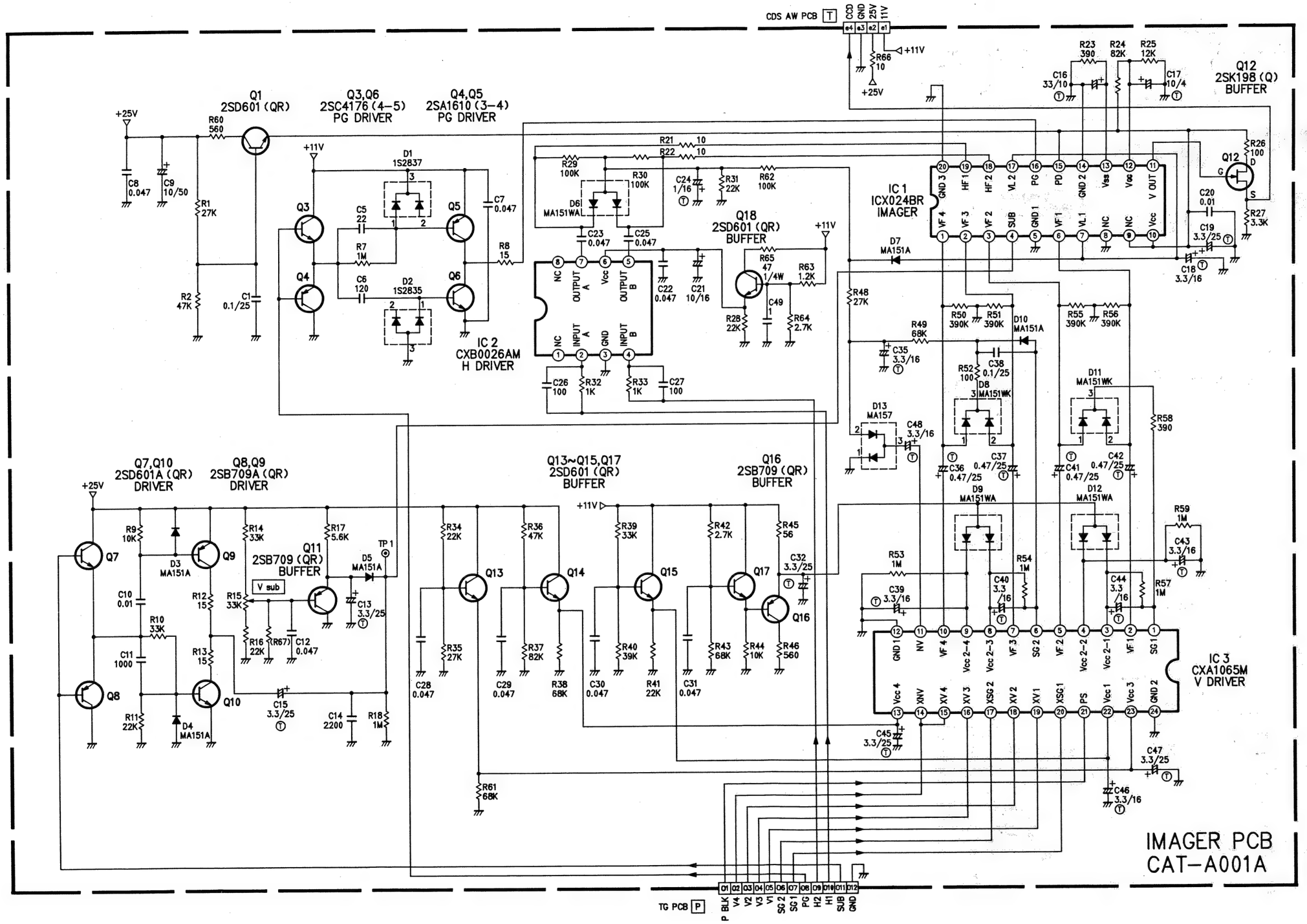
■ SSG PCB(CAT-C501A)CIRCUIT DIAGRAM



■ TG PCB(CAT-B501A)CIRCUIT DIAGRAM

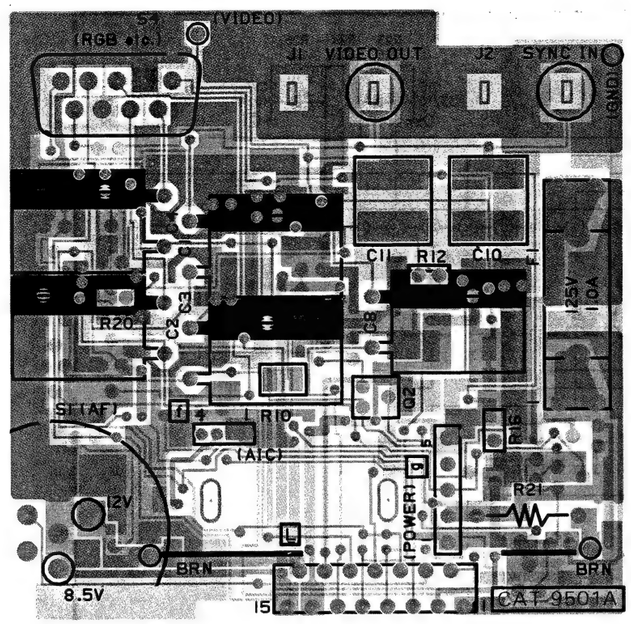


■IMAGER PCB(CAT-A001A)CIRCUIT DIAGRAM

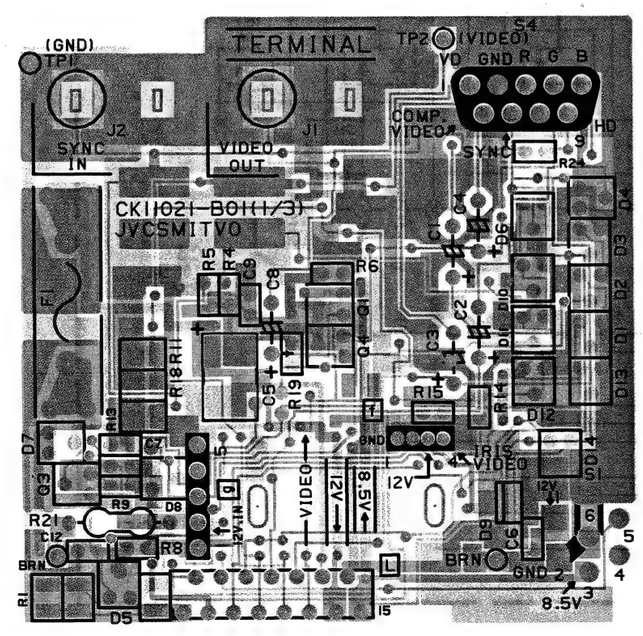


■ TERMINAL PCB(CAT-9501A) PATTEN

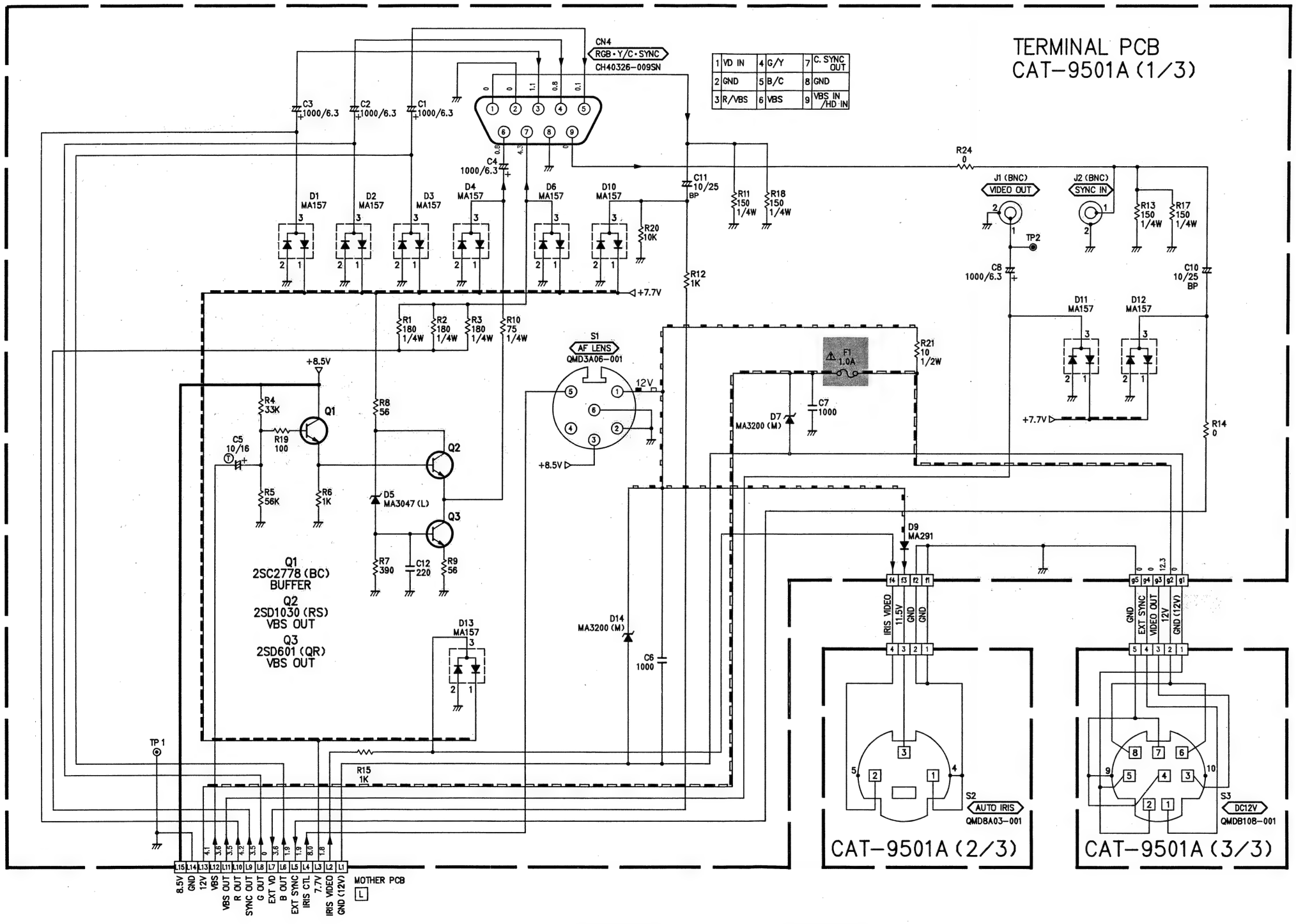
TOP VIEW



BOTTOM VIEW

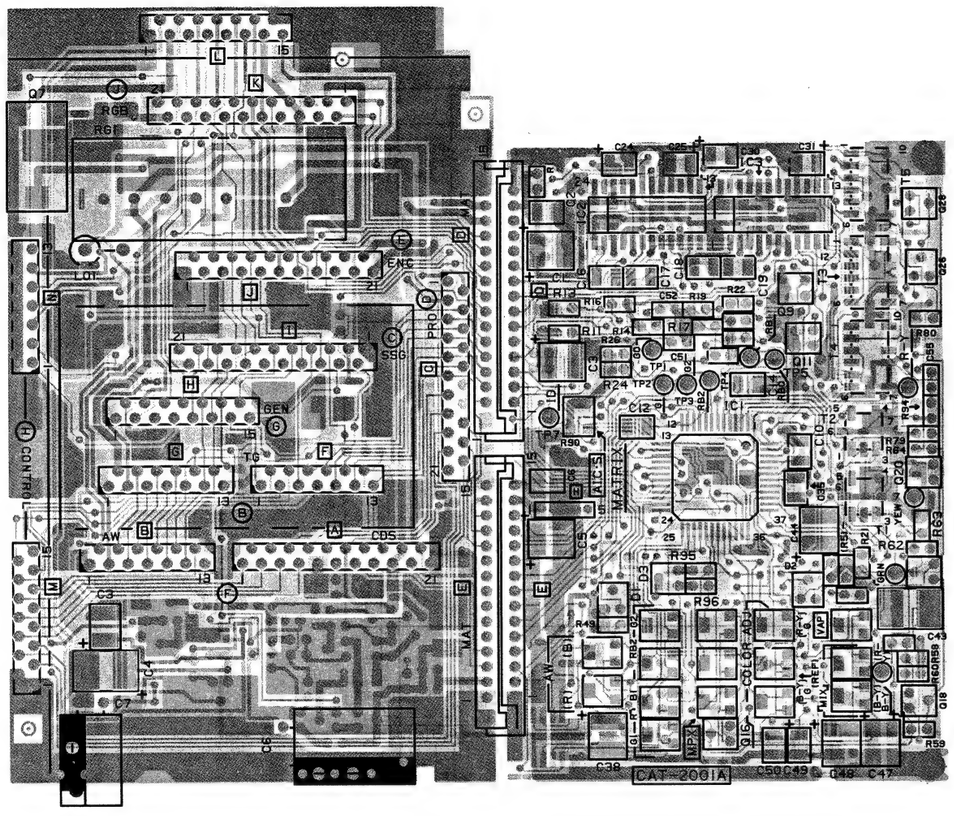


■TERMINAL PCB(CAT-9501A)CIRCUIT DIAGRAM

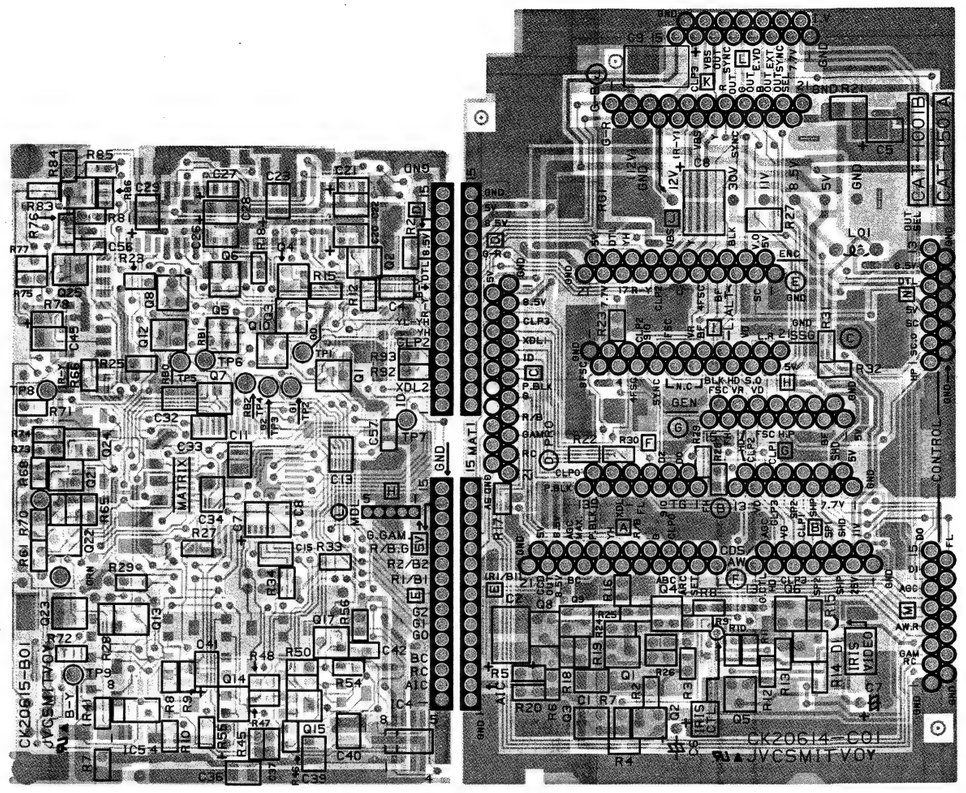


■ MOTHER / MATRIX PCB (CAT-1501A/CAT-2001A) PATTEN

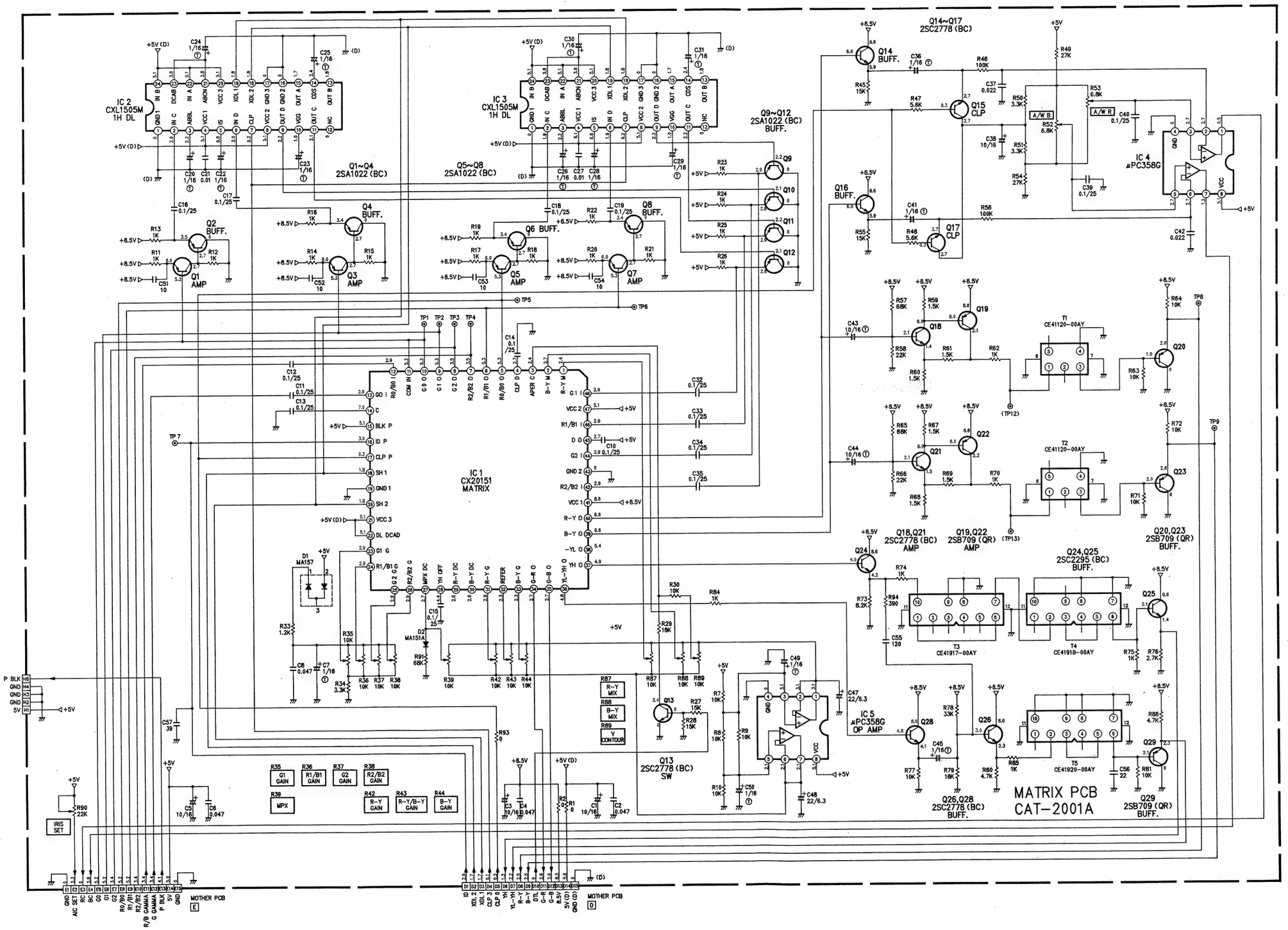
TOP VIEW



BOTTOM VIEW

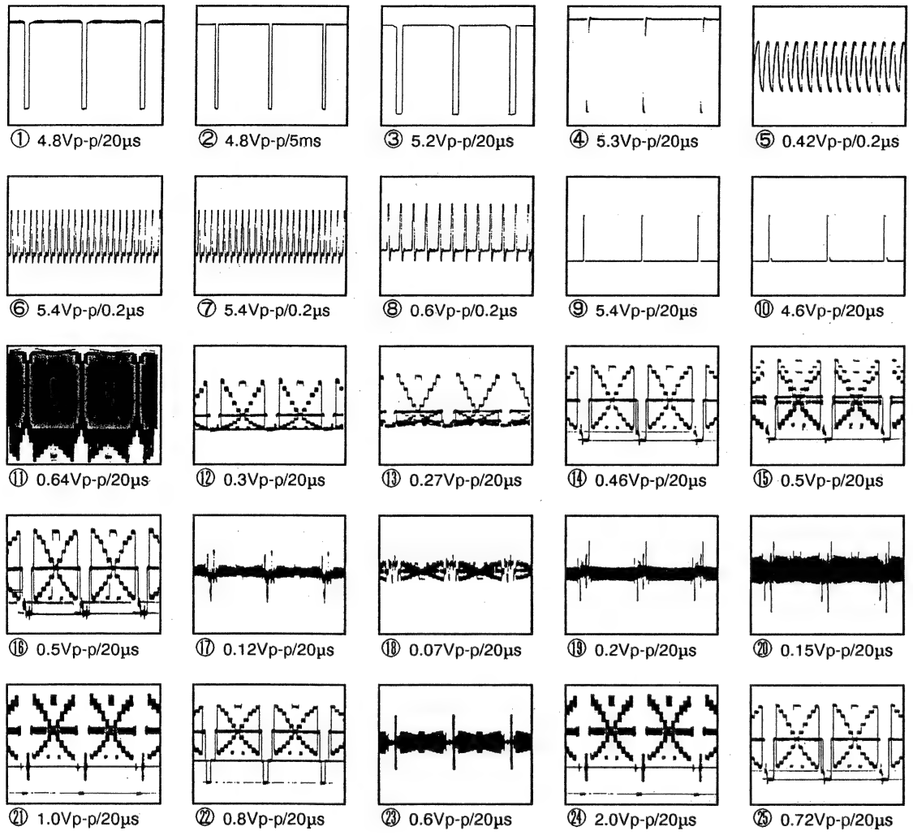


■ MATRIX PCB(CAT-2001A)CIRCUIT DIAGRAM

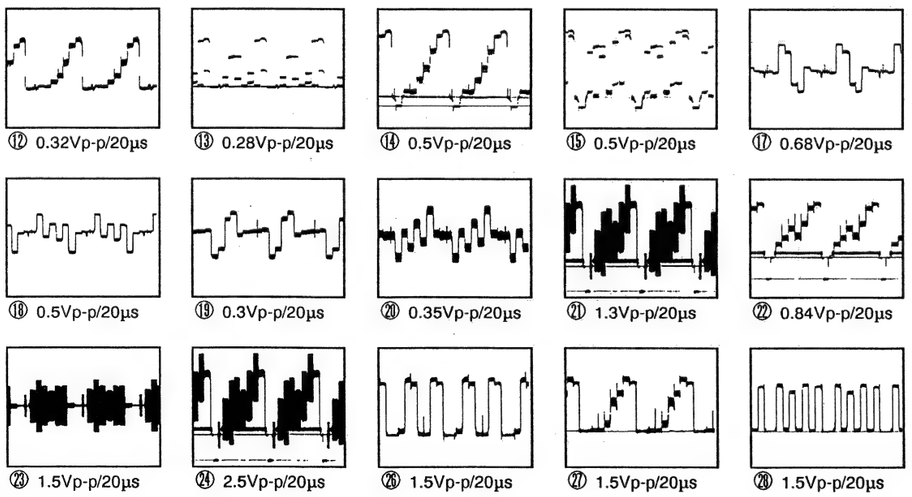


■ MOTHER PCB(CAT-1501A)WAVE FORM

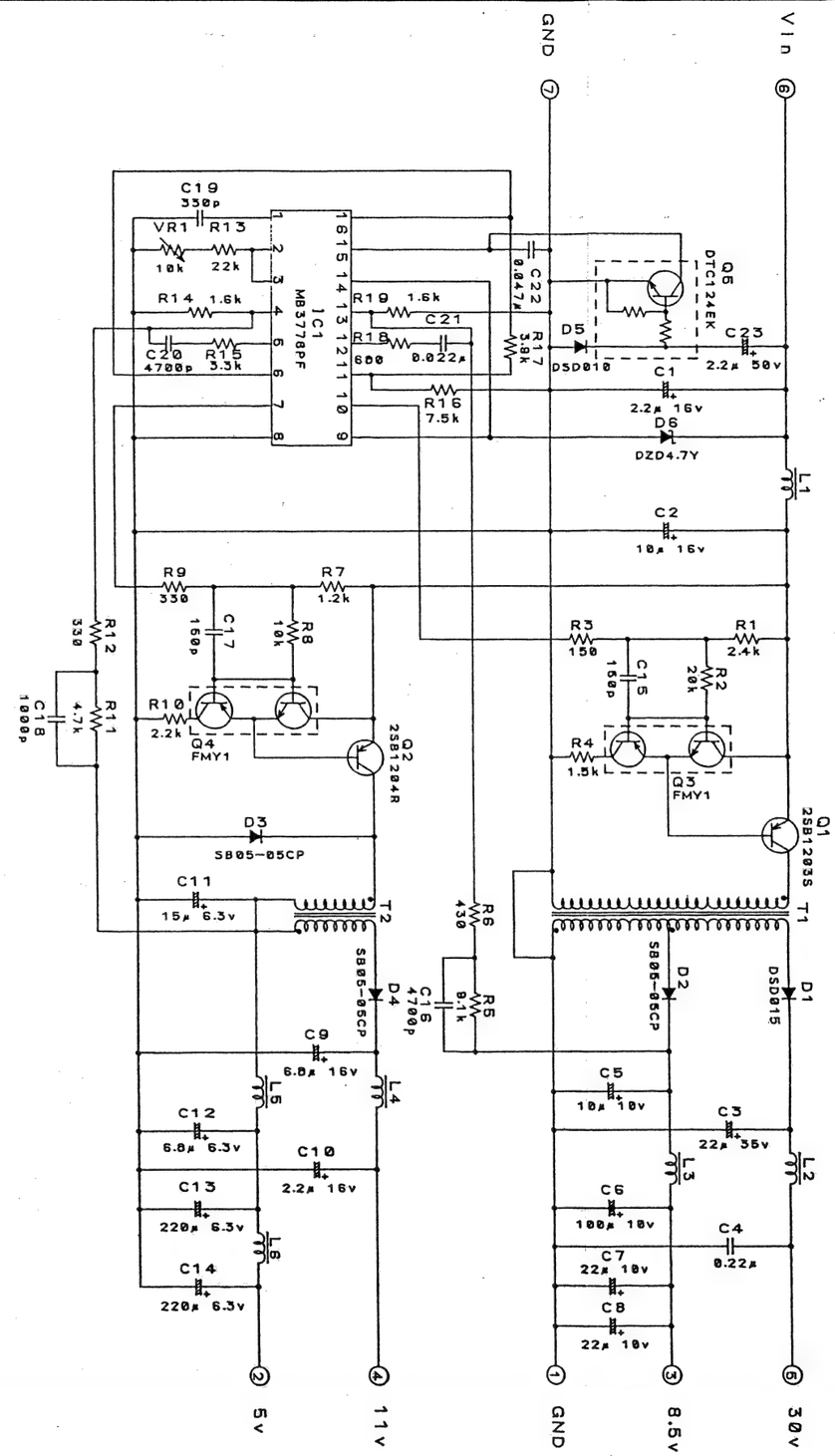
Object = Gray scale pattern (GS-2A)



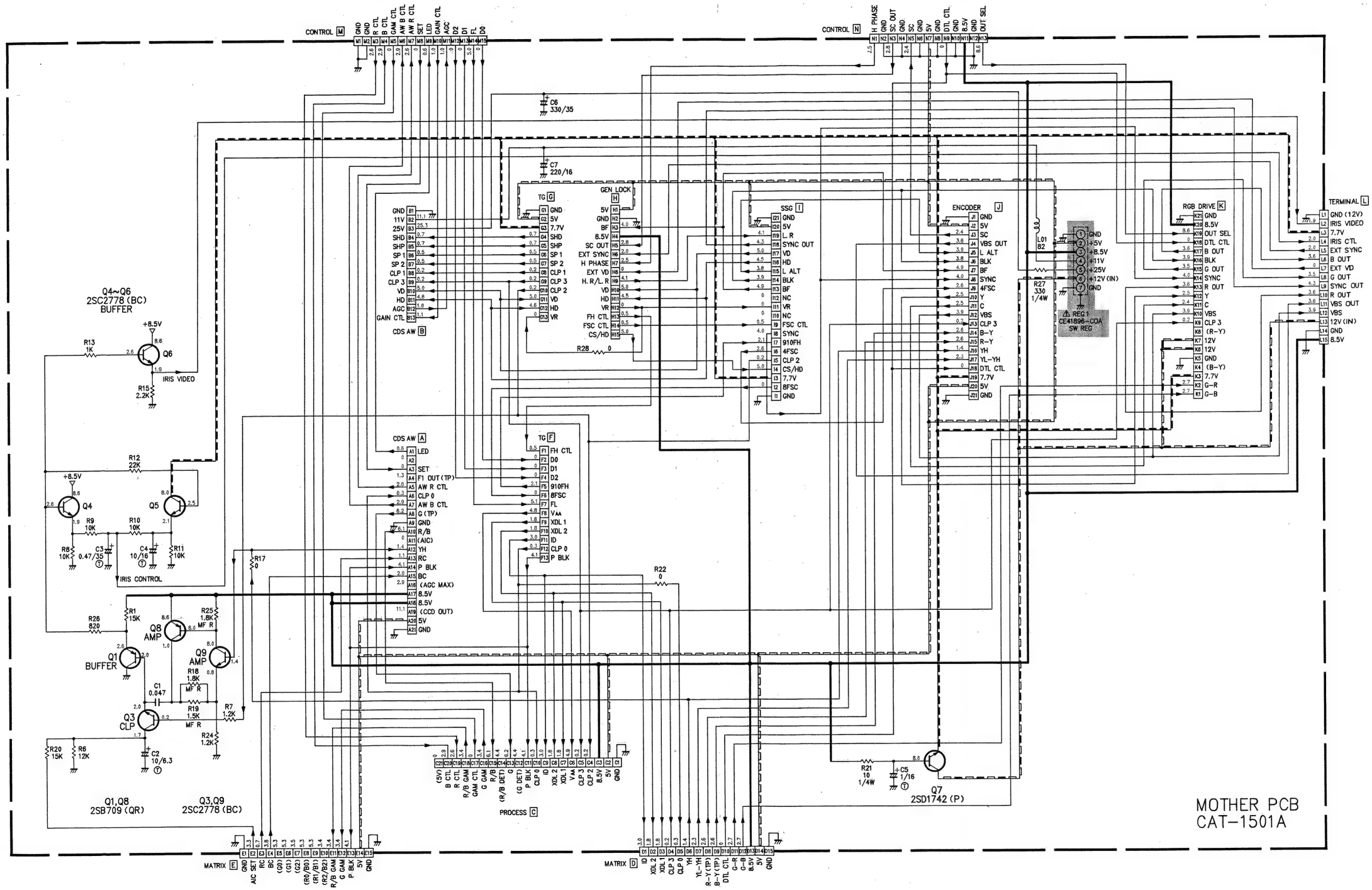
Object = Color bar pattern (CC-2T)



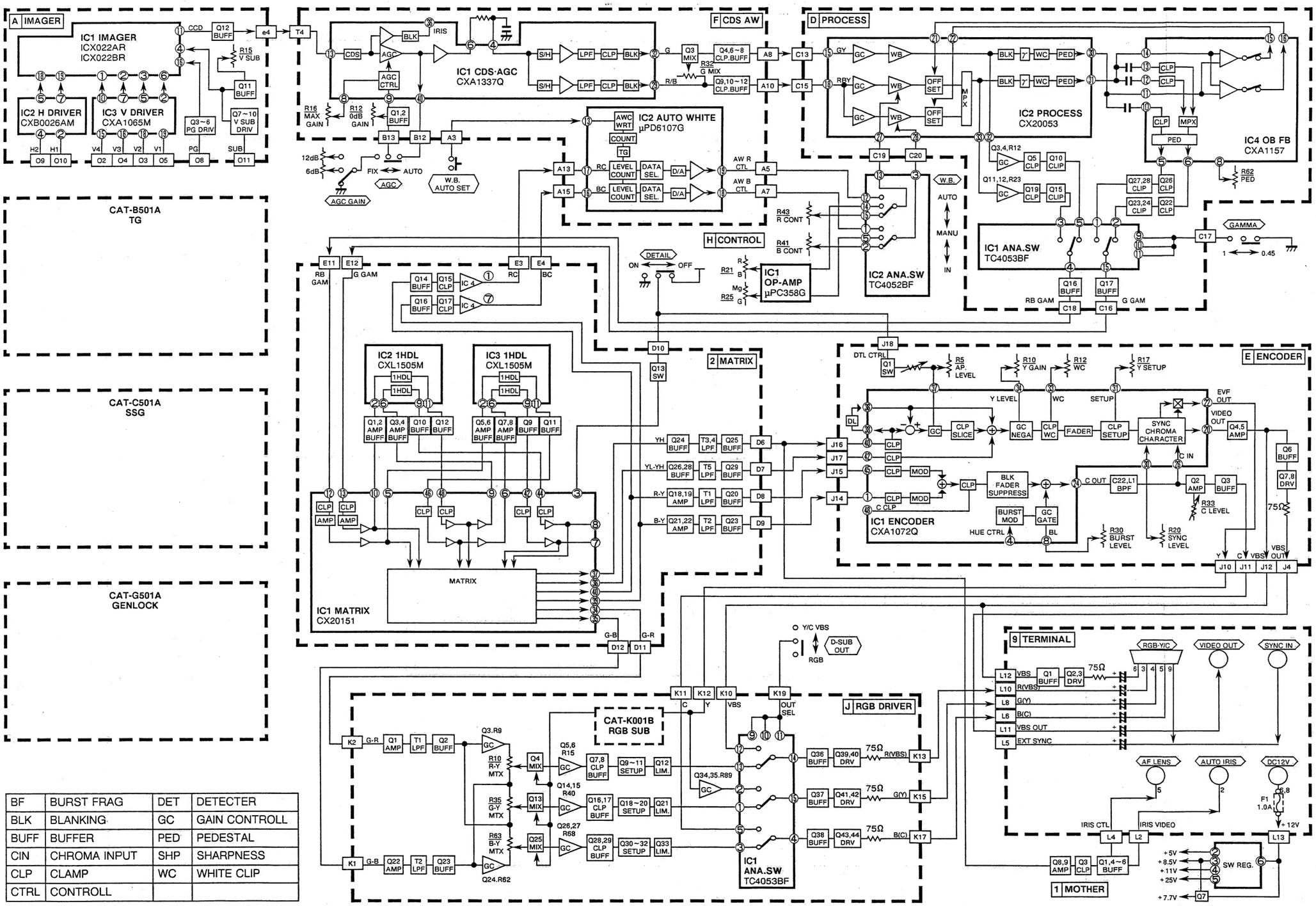
■ SW REG.(CE41896-C0A)CIRCUIT DIAGRAM



■ MOTHER PCB(CAT-1501A)CIRCUIT DIAGRAM

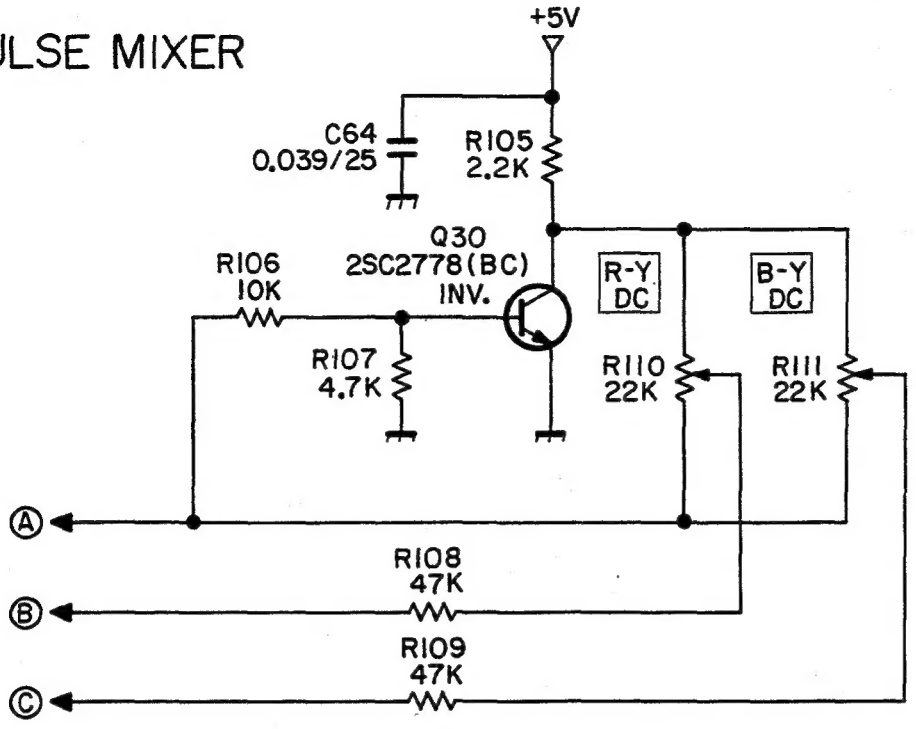


■ VIDEO SIGNAL BLOCK DIAGRAM

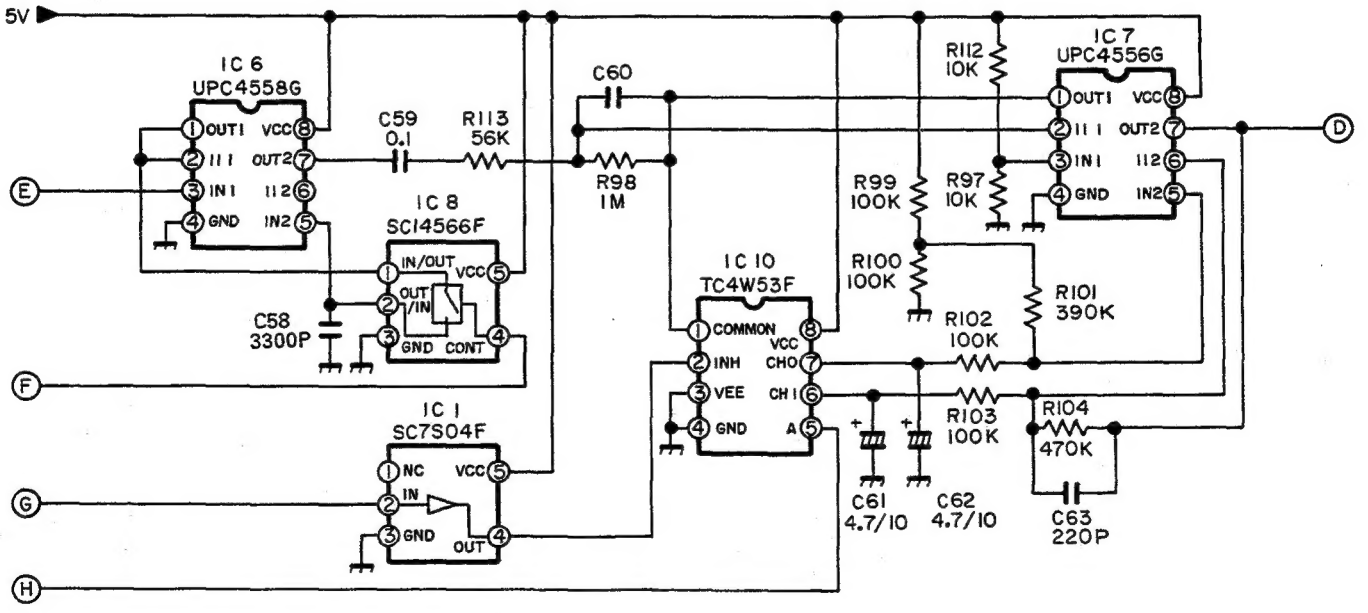


BF	BURST FRAG	DET	DETECTER
BLK	BLANKING	GC	GAIN CONTROLL
BUFF	BUFFER	PED	PEDESTAL
CIN	CHROMA INPUT	SHP	SHARPNESS
CLP	CLAMP	WC	WHITE CLIP
CTRL	CONTROLL		

PULSE MIXER



LINE OFFSET COMPENSATOR



● **MATRIX board assembly list** [0][1]

CAT-2002A [0][1][ ][ ][ ][ ][ ][ ]

Symbol No.	Part No.	Part Name	Description	
IC2001	CX20151	I.C.(M)	SONY	
IC2002	CXL1505M-C1	I.C.(M)	SONY	
IC2003	CXL1505M-C1	I.C.(M)	SONY	
IC2004	UPC358G	I.C.(M)	NEC	
IC2005	UPC358G	I.C.(M)	NEC	
IC2006	UPC4558G	I.C.(M)	NEC	
IC2007	UPC4556G	I.C.(M)	NEC	
IC2008	SC14S66F	I.C.(M)	TOSHIBA	
IC2009	SC7S04F	I.C.(M)	MOTOROLA	
IC2010	TC4W53F	I.C.(M)	TOSHIBA	
Q2001	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2002	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2003	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2004	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2005	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2006	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2007	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2008	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2009	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2010	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2011	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2012	2SA1022(BC)	TRANSISTOR	MATSUSHITA	
Q2013	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2014	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2015	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2016	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2017	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2018	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2019	2SB709(QR)	TRANSISTOR	MATSUSHITA	
Q2020	2SB709(QR)	TRANSISTOR	MATSUSHITA	
Q2021	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2022	2SB709(QR)	TRANSISTOR	MATSUSHITA	
Q2023	2SB709(QR)	TRANSISTOR	MATSUSHITA	
Q2024	2SC2295(BC)	TRANSISTOR	MATSUSHITA	
Q2025	2SC2295(BC)	TRANSISTOR	MATSUSHITA	
Q2026	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2028	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
Q2029	2SB709(QR)	TRANSISTOR	MATSUSHITA	
Q2030	2SC2778(BC)	TRANSISTOR	MATSUSHITA	
D2001	MA157	SI.DIODE	MATSUSHITA	
R2001	QRSA08J-0R0	M.G.RESISTOR	0	1/10W
R2002	QRSA08J-0R0	M.G.RESISTOR	0	1/10W
R2007	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2008	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2009	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2010	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2011	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2012	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2013	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2014	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2015	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2016	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2017	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2018	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2019	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2020	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W

Symbol No.	Part No.	Part Name	Description	
R2021	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2022	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2023	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2024	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2025	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2026	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2027	QRSA08J-153	M.G.RESISTOR	15K	1/10W
R2028	QRSA08J-153	M.G.RESISTOR	15K	1/10W
R2029	QRSA08J-183	M.G.RESISTOR	18K	1/10W
R2030	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2033	QRSA08J-122	M.G.RESISTOR	1.2K	1/10W
R2034	QRSA08J-332	M.G.RESISTOR	3.3K	1/10W
R2035	CEVP005-103	TRIM.RESISTOR	10K	G1.GAIN
R2036	CEVP005-103	TRIM.RESISTOR	10K	R1/B1.GAIN
R2037	CEVP005-103	TRIM.RESISTOR	10K	G2.GAIN
R2038	CEVP005-103	TRIM.RESISTOR	10K	R2/B2.GAIN
R2042	CEVP005-103	TRIM.RESISTOR	10K	R-Y.GAIN
R2043	CEVP005-103	TRIM.RESISTOR	10K	R-Y/B-YGAIN
R2044	CEVP005-103	TRIM.RESISTOR	10K	B-Y.GAIN
R2045	QRSA08J-153	M.G.RESISTOR	15K	1/10W
R2046	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2047	QRSA08J-562	M.G.RESISTOR	5.6K	1/10W
R2048	QRSA08J-562	M.G.RESISTOR	5.6K	1/10W
R2049	QRSA08J-273	M.G.RESISTOR	27K	1/10W
R2050	QRSA08J-332	M.G.RESISTOR	3.3K	1/10W
R2051	QRSA08J-332	M.G.RESISTOR	3.3K	1/10W
R2052	CEVP005-682	TRIM.RESISTOR	6.8K	A/W.B
R2053	CEVP005-682	TRIM.RESISTOR	6.8K	A/W.R
R2054	QRSA08J-273	M.G.RESISTOR	27K	1/10W
R2055	QRSA08J-153	M.G.RESISTOR	15K	1/10W
R2056	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2057	QRSA08J-683	M.G.RESISTOR	68K	1/10W
R2058	QRSA08J-223	M.G.RESISTOR	22K	1/10W
R2059	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2060	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2061	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2062	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2063	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2064	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2065	QRSA08J-683	M.G.RESISTOR	68K	1/10W
R2066	QRSA08J-223	M.G.RESISTOR	22K	1/10W
R2067	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2068	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2069	QRSA08J-152	M.G.RESISTOR	1.5K	1/10W
R2070	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2071	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2072	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2073	QRSA08J-822	M.G.RESISTOR	8.2K	1/10W
R2074	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2075	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2076	QRSA08J-272	M.G.RESISTOR	2.7K	1/10W
R2077	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2078	QRSA08J-333	M.G.RESISTOR	33K	1/10W
R2079	QRSA08J-183	M.G.RESISTOR	18K	1/10W
R2080	QRSA08J-472	M.G.RESISTOR	4.7K	1/10W
R2081	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2084	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2085	QRSA08J-102	M.G.RESISTOR	1.0K	1/10W
R2086	QRSA08J-472	M.G.RESISTOR	4.7K	1/10W

Symbol No.	Part No.	Part Name	Description	
R2087	CEVP005-103	TRIM.RESISTOR	10K	R-Y.MIX
R2088	CEVP005-103	TRIM.RESISTOR	10K	B-Y.MIX
R2089	CEVP005-103	TRIM.RESISTOR	10K	V.CONTOUR
R2090	CEVP005-223	TRIM.RESISTOR	22K	IRIS.SET
R2093	QRSA08J-0R0	M.G.RESISTOR	0	1/10W
R2094	QRSA08J-391	M.G.RESISTOR	390	1/10W
R2097	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2098	QRSA08J-105	M.G.RESISTOR	1.0M	1/10W
R2099	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2100	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2101	QRSA08J-394	M.G.RESISTOR	390K	1/10W
R2102	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2103	QRSA08J-104	M.G.RESISTOR	100K	1/10W
R2104	QRSA08J-474	M.G.RESISTOR	470K	1/10W
R2105	QRSA08J-222	M.G.RESISTOR	2.2K	1/10W
R2106	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2107	QRSA08J-472	M.G.RESISTOR	4.7K	1/10W
R2108	QRSA08J-473	M.G.RESISTOR	47K	1/10W
R2109	QRSA08J-473	M.G.RESISTOR	47K	1/10W
R2110	CEVP005-223	TRIM.RESISTOR	22K	R-Y.DC
R2111	CEVP005-223	TRIM.RESISTOR	22K	B-Y.DC
R2112	QRSA08J-103	M.G.RESISTOR	10K	1/10W
R2113	QRSA08J-563	M.G.RESISTOR	56K	1/10W
C2001	NEA11CM-106	E.CAPACITOR	10	16V
C2002	NCF11HZ-473	CER.CAPACITOR	0.047	50V
C2003	NEA11CM-106	E.CAPACITOR	10	16V
C2004	NCF11HZ-473	CER.CAPACITOR	0.047	50V
C2005	NEA11CM-106	E.CAPACITOR	10	16V
C2006	NCF11HZ-473	CER.CAPACITOR	0.047	50V
C2007	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2008	NCF11HZ-473	CER.CAPACITOR	0.047	50V
C2010	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2011	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2012	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2013	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2014	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2015	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2016	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2017	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2018	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2019	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2020	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2021	NCB21HK-103	CER.CAPACITOR	0.010	50V
C2022	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2023	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2024	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2025	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2026	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2027	NCB21HK-103	CER.CAPACITOR	0.010	50V
C2028	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2029	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2030	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2031	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2032	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2033	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2034	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2035	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2036	NEE21CM-105	TAN.CAPACITOR	1.0	16V

Symbol No.	Part No.	Part Name	Description	
C2037	NCB21HK-223	CER.CAPACITOR	0.022	50V
C2038	NEA11CM-106	E.CAPACITOR	10	16V
C2039	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2040	NCB11EK-104	CER.CAPACITOR	0.10	25V
C2041	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2042	NCB21HK-223	CER.CAPACITOR	0.022	50V
C2043	NEE11CM-106	TAN.CAPACITOR	10	16V
C2044	NEA11CM-106	E.CAPACITOR	10	16V
C2045	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2047	NEA10JM-226	E.CAPACITOR	22	6.3V
C2048	NEA10JM-226	E.CAPACITOR	22	6.3V
C2049	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2050	NEE21CM-105	TAN.CAPACITOR	1.0	16V
C2051	NCT03CH-100	CER.CAPACITOR	10P	50V
C2052	NCT03CH-100	CER.CAPACITOR	10P	50V
C2053	NCT03CH-100	CER.CAPACITOR	10P	50V
C2054	NCT03CH-100	CER.CAPACITOR	10P	50V
C2055	NCS21HJ-121	CER.CAPACITOR	120P	50V
C2056	NCT03CH-220	CER.CAPACITOR	22P	50V
C2057	NCT03CH-390	CER.CAPACITOR	39P	50V
C2058	NCB21HK-332	CER.CAPACITOR	3300P	50V
C2059	NCB11HK-104	CER.CAPACITOR	0.10	50V
C2061	NEE11AM-475	TAN.CAPACITOR	4.7	10V
C2062	NEE11AM-475	TAN.CAPACITOR	4.7	10V
C2063	NCT03CH-221	CER.CAPACITOR	220P	50V
C2064	NCB21EK-393	CER.CAPACITOR	0.039	25V
TP2001	CM47280-001	TEST POINT		
TP2002	CM47280-001	TEST POINT		
TP2003	CM47280-001	TEST POINT		
TP2004	CM47280-001	TEST POINT		
TP2005	CM47280-001	TEST POINT		
TP2006	CM47280-001	TEST POINT		
TP2007	CM47280-001	TEST POINT		
TP2008	CM47280-001	TEST POINT		
TP2009	CM47280-001	TEST POINT		
T2001	CE41120-00A	TRANSFORMER		
T2002	CE41120-00A	TRANSFORMER		
T2003	CE41917-00A	TRANSFORMER		
T2004	CE41918-00A	TRANSFORMER		
T2005	CE41920-00A	L.P.F.		